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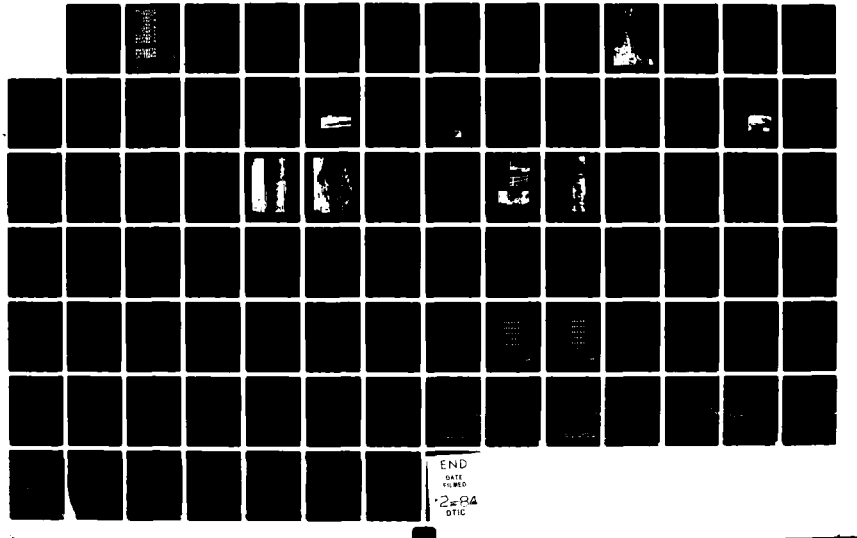

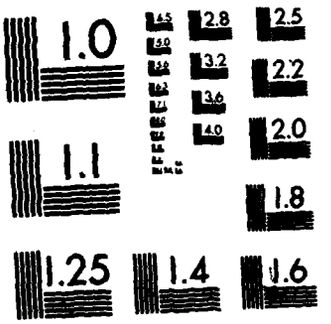

RECONNAISSANCE REPORT

AD-A136683

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REPORT FOR FLOOD CONTROL AND ALLIED PURPOSES

WHITEWATER RIVERBASIN CALIFORNIA

JUNE 1978

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U.S. ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) RECONNAISSANCE REPORT REPORT FOR FLOOD CONTROL AND ALLIED PURPOSES WHITEWATER RIVER BASIN CALIFORNIA		5. TYPE OF REPORT & PERIOD COVERED 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT P.O. BOX 2711, LOS ANGELES, CA 90053		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT P.O. BOX 2711, LOS ANGELES DISTRICT		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT P.O. BOX 2711, LOS ANGELES, CA 90053		12. REPORT DATE JUNE 1978 13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Copies are obtainable from the National Technical Information Services, Springfield, VA 22151

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

-The purpose of this reconnaissance study is twofold. First, it provides for initial iterations of the four functional planning tasks - problem identification, formulation of alternatives, impact assessment, and evaluation - to obtain a preliminary view of what the overall study will involve. Second, it determines how the study will be managed.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

RECONNAISSANCE REPORT

REPORT FOR FLOOD CONTROL AND ALLIED PURPOSES
WHITEWATER RIVER BASIN
CALIFORNIA

U.S. ARMY ENGINEER DISTRICT
LOS ANGELES
CORPS OF ENGINEERS

JUNE 1978

SYLLABUS

Congressional authority for the Whitewater River study for flood control and allied purposes is contained in the Flood Control Act of 1937 and a resolution adopted by the House Committee on Public Works and Transportation in 1977.

There are two different types of flood problems within the Whitewater River Basin, a 1,950-square-mile interior basin draining into Salton Sea. The basin is located 100 miles east of Los Angeles. On the Whitewater River tributaries, flooding of alluvial fans threatens inhabitants along Smith Creek, Jenson Creek, Stubbe Canyon, Mission Creek and in the Rancho Mirage, Palm Desert, Indian Wells, La Quinta, Thousand Palms, and Oasis areas. The high intensity of floods and randomness of the flood path on these fans create an unusual hazard to inhabitants. Flooding along the Whitewater River main stem is more predictable but nevertheless severe. Communities along the main stem subject to flooding include Palm Springs, Cathedral City, Rancho Mirage, Palm Desert, Indian Wells, Indio, Coachella, and Mecca, as well as the large, highly productive agricultural area in the lower Coachella Valley. The largest city in the area is Palm Springs, with a population of 31,000. Large floods in 1965, 1966, 1969, and 1976 caused substantial damage to urban and agricultural areas throughout the basin. The most damaging floods of record – in September 1976 – caused $18 million in damages. Half of these damages occurred in the neighboring communities of Palm Desert, Rancho Mirage, and Indian Wells.

SYLLABUS

Reduction of flood damages as well as reduction of blowsand damage, water quality improvement, water conservation, air quality improvement, and provision for recreation are planning objectives for this study. Preliminary studies indicate that there may be a relationship between floods and blowsand damages.

The Riverside County Flood Control and Water Conservation District and the Coachella Valley County Water District, the two sponsoring agencies, have requested that certain areas and problems be given consideration in the current study. Preliminary studies were made of these areas, with findings as follows: (1) Further studies of Smith Creek, Jenson Creek, Stubbe Canyon, Thousand Palms (Edom Area), Rancho Mirage, and Oasis Area are not warranted at this time. (2) Further studies of the main stem of the Whitewater River, Mission Creek, Palm Desert, Indian Wells, and La Quinta are warranted. During Stage 2 (Development of Intermediate Plans), alternative solutions, including both structural and nonstructural, will be developed for the areas warranting detailed study.

During the planning process, public involvement will be encouraged in the formulation of both structural and nonstructural solutions to the water resources problems of the Whitewater River Basin. The study is estimated to cost $1,450,000 and will be completed in September 1981.

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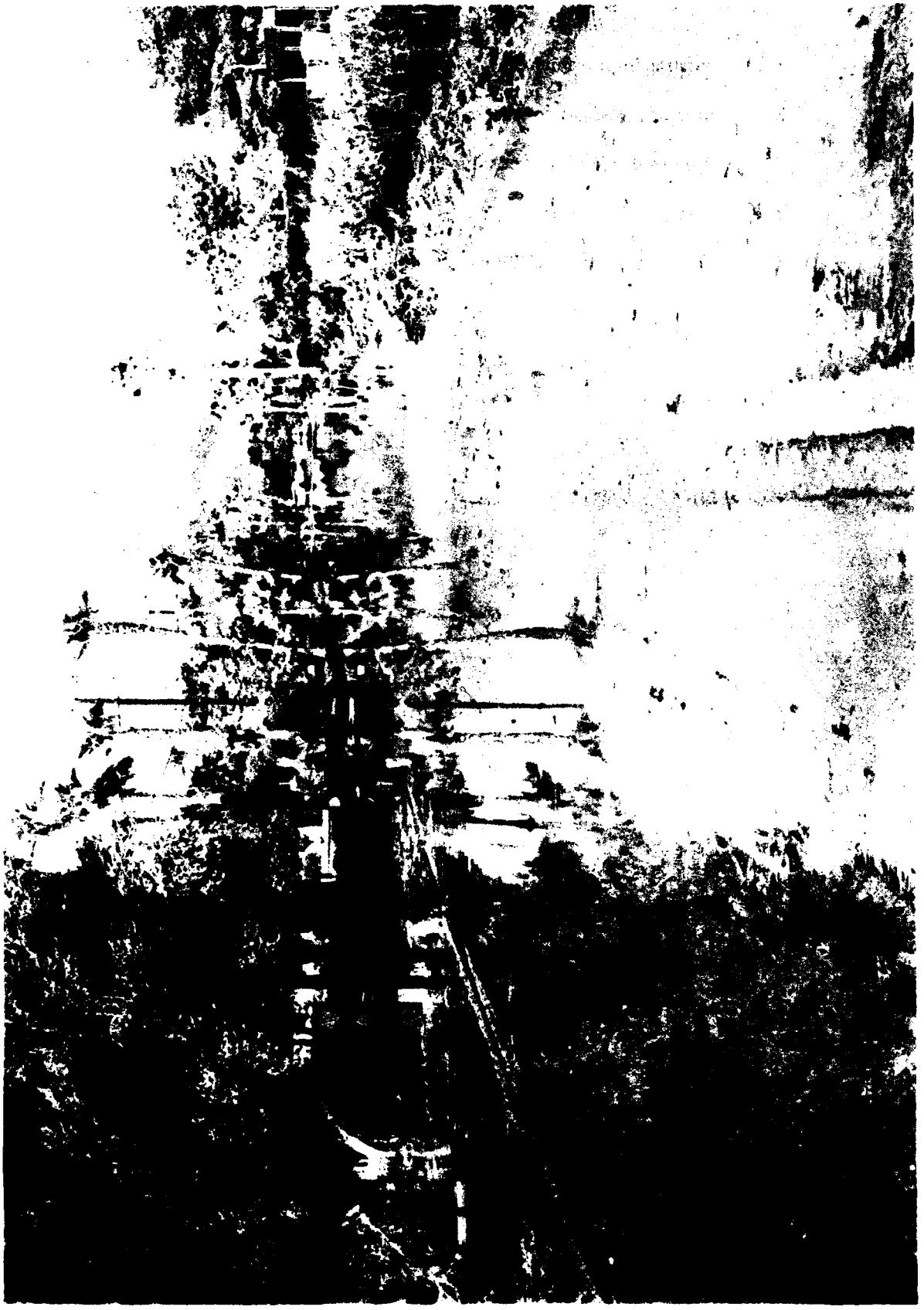


RECONNAISSANCE REPORT
WHITEWATER RIVER BASIN, CALIFORNIA

AUTHORIZATION FOR THE STUDY

Authorization for this study is contained in the following resolution adopted on 10 May 1977 by the Committee on Public Works and Transportation of the U.S. House of Representatives:

> Resolved by the Committee on Public Works and Transportation of the House of Representatives, United States, that the Board of Engineers for Rivers and Harbors is hereby requested to review the prior reports of the Chief of Engineers on the Whitewater River, California, published as House Document 171, 86th Congress, 1st Session, and House Document 223, 89th Congress, 1st Session, and other pertinent reports to determine whether or not any modifications are advisable at the present time, with particular reference to the physical, environmental, social and economic structure and needs of the Whitewater River Basin, including flood control and the development, management, conservation and environmental enhancement of the water and related land resources of the basin and the future well-being of the people in the area. Such review shall include, but not be limited to basin watershed conservancy program, water quality protection and enhancement, and fish and wildlife preservation.

AUTHORIZATION

This authority has been combined with the outstanding authority for an investigation of the Whitewater River, California, authorized by the Flood Control Act, approved 28 August 1937. Several flood control projects, including works to provide protection along Tahchevah Creek in Palm Springs and two small flood control projects consisting of the Banning levee in Banning and the Chino Canyon levee and

channel in Palm Springs, have resulted from studies conducted under the 1937 authority. See plate 1. The Tahchevah flood control project was completed in March 1965; the Banning levee in October 1965; and the Chino Canyon levee and channel in February 1972. Work on a flood control project for Tahquitz Creek, also in Palm Springs, has been postponed indefinitely pending results of a study of an alternate plan by local interests.

PURPOSE OF RECONNAISSANCE STUDY

PURPOSE OF RECONNAISSANCE

The purpose of this reconnaissance study is twofold. First, it provides for initial iterations of the four functional planning tasks -- problem identification, formulation of alternatives, impact assessment, and evaluation -- to obtain a preliminary view of what the overall study will involve. Second, it determines how the study will be managed.

This reconnaissance study emphasizes problem identification. Every effort was made to obtain a clear, initial definition of the planning objectives and problems, realizing that the objectives will be subsequently refined and modified. The remaining tasks -- formulation of alternatives, impact assessment, and evaluation -- were performed to indicate the kinds of alternative resource management programs that could potentially be undertaken in the study.

Existing information specific to the study area served as the foundation for subsequent planning. However, this reconnaissance study appraised the adequacy of existing information and data and specifies subsequent steps necessary to expand base data.

In addition, a systematic program for conducting the study was established in this reconnaissance study. The management of the overall study effort was specified, study participants identified, necessary coordination determined, and professional skills to carry out the study identified.

PLANNING PROCESS

GENERAL

PLANNING PROCESS

This overall study will be conducted in three distinct, but related, planning stages. They are: Stage 1 -- reconnaissance study (presented herein); Stage 2 -- development of intermediate plans; and Stage 3 -- development of detailed plans. Each planning stage will consider four tasks -- problem identification, formulation of alternatives, impact assessment, and evaluation.

FOUR FUNCTIONAL TASKS

PROBLEM IDENTIFICATION

Problem identification involves the determination of the range of water and related land resources problems in the study area. This task identifies resource management problems and public concerns, defines the study area, describes the base condition, projects future conditions, and establishes planning objectives.

FORMULATION OF ALTERNATIVES

Formulation of alternatives involves the development of different plans to address the planning objectives. Plans which best address NED (National Economic Development), EQ (Environmental Quality), and a mix of the two will be identified.

IMPACT ASSESSMENT

Impact assessment involves the identification, description, and, if possible, prediction of the effects of the different alternative plans.

EVALUATION

Evaluation involves a comparison of the probable impact of each plan against the "without condition" and against the other plans.

THREE-STAGE PLANNING

Stage 1 – During this initial stage, the four functional tasks are performed at a preliminary level of detail to define the scope and character of the study as a guide to subsequent planning. The principal emphasis is on identification of problems and measures to solve water resources problems and a determination of the need to further study these areas. This reconnaissance report represents completion of the first stage.

Stage 2 – The intermediate stage study will emphasize the development of a broad range of alternatives. The potential impacts of these alternative plans will be assessed, concentrating on their significant consequences.

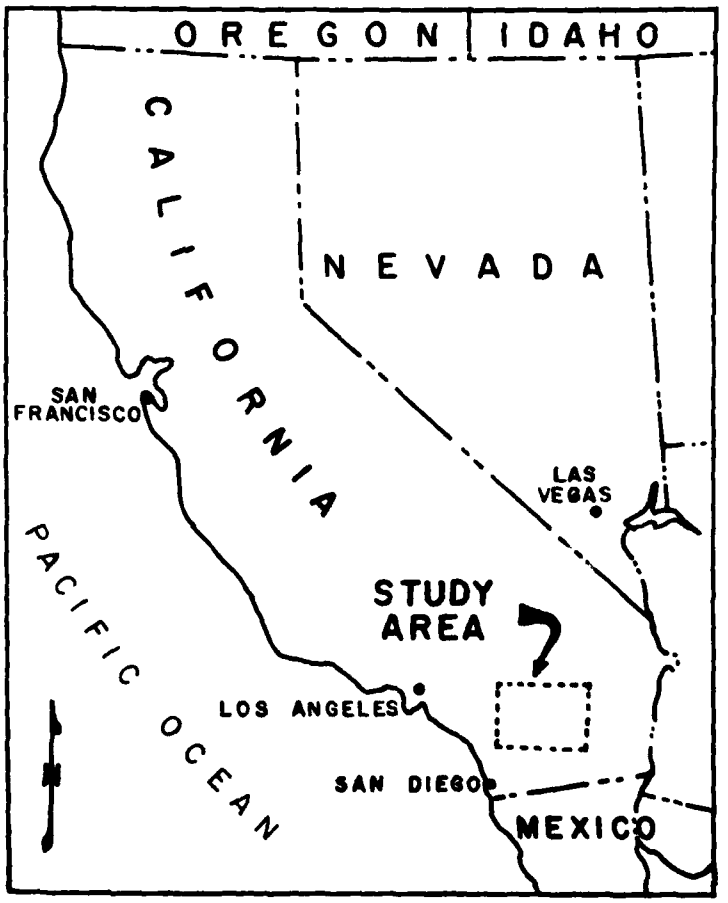
Stage 3 – During the final stage, emphasis will be on impact assessment and evaluation and on modifying and reducing in number the intermediate alternatives developed during Stage

2 planning. The resulting alternative plans must be presented in sufficient detail to permit an effective choice and, if appropriate, a recommendation that can be implemented.

AREA OF STUDY

STUDY AREA

The area of study encompasses the entire reach of the Whitewater River, together with its tributaries, and comprises about 1950 square miles. The study area, which is located in Riverside and San Bernardino Counties, is about 100 miles east of Los Angeles and extends from the city of Banning to the Salton Sea, a distance of about 70 miles. The primary study area, however, is in Riverside County. Plate 2 shows the general study area. The vicinity map below also shows the location of the study area.



PROBLEM IDENTIFICATION

INTRODUCTION

PROBLEM I.D.

The purpose of problem identification is to survey existing and projected resource conditions in the area in order to identify the range of water and related land resources problems. Problem identification culminates in the establishment of planning objectives.

Updating and evaluating information collected during previous studies has been a major part of the activities involved in the problem identification process during this reconnaissance study. However, Federal planning regulations, especially regarding socio-economic and environmental data, require that additional information be collected.

SCOPE OF STUDY

STUDY SCOPE

The entire reach of the Whitewater River, together with its tributaries, is being considered in this study. The Riverside County Flood Control and Water Conservation District and the Coachella Valley County Water District, the sponsoring agencies, have requested that certain specific areas within the general study area be given consideration. These areas are: Whitewater-San Gorgonio Rivers, Smith Creek (near Banning), Jenson Creek (near Cabazon), Stubbe Canyon, Mission Creek, Thousand Palms (Edom Area), Rancho Mirage, Palm Desert, Indian Wells, La Quinta, and the Oasis Area.

The Riverside County Flood Control and Water Conservation District has indicated that it has the capability to resolve any flood problems that may occur along Palm Canyon Wash and Tahquitz Creek at Palm Springs and along Cathedral Canyon at Cathedral City.

GENERAL DESCRIPTION OF WHITEWATER RIVER BASIN

BASIN DESCRIPTION

The Whitewater River drains an interior basin in southern California located principally in Riverside County. The drainage area, which is bounded on the east, north, west, and south by mountains and on the southeast by the Salton Sea, contains about 1,950 square miles, of which 400 square miles comprise valley land and 1,550 square miles are precipitous watersheds of three mountain ranges – the San Bernardino, the San Jacinto, and the Santa Rosa, in addition to the lesser ranges that extend eastward.

The Whitewater River originates in the San Bernardino Mountains near the northwest boundary of the drainage area and flows southeastward about 20 miles through a rugged mountainous area, from which it emerges to join the San Gorgonio River, its principal tributary. From this confluence, the course of the Whitewater River continues southeastward for 50 miles, passing through the Coachella Valley to the Salton Sea. The Whitewater River Basin is a closed inland basin in that all flows discharge into the Salton Sea.

The gradients of nearly all the streams in the basin are very steep. The gradient in the mountains ranges from about 500 feet to about 1,400 feet per mile. The average gradient of the Whitewater River from the canyon mouth to Palm Springs is about 92 feet per mile; from Palm Springs to Point Happy, about 21 feet per mile; and from Point Happy to the Salton Sea, about 13.5 feet per mile. The average gradient of tributaries to the Whitewater River is about 180 feet per mile.

Coachella Valley lies to the northwest of the Salton Sea. It is a broad, flat alluvial area occupying about 230 square miles of the lower part of the Whitewater River Basin.

The climate of the Whitewater River Basin ranges from humid to arid, depending largely on elevation. The winters are short and mild; and the summers, long and hot. Recorded extremes of temperature are below freezing and over 120° F.

The Agua Caliente, Cabezon, Augustine, Torres-Martinez, Mission Creek, and Morongo Indian Reservations lie within the study boundaries, occupying land in a checkerboard pattern in much of the study area.

BASE CONDITION

BASIN HISTORY

Development of the Coachella Valley began in 1888 when a water-bearing sand and gravel strata was found beneath the ground surface. Growth was slow, even though economical well-drilling methods were developed, until Colorado River water was imported into the lower Coachella Valley through the All-American Canal in 1949. A rapid increase in irrigated farming in the lower valley resulted in a commensurate rapid increase in population. In contrast, growth in the upper Coachella Valley has been the result of resort activities. Mild winter temperatures and an arid climate create an environment where both activities thrive.

ECONOMICS

The economy of the Whitewater River Basin is dominated by irrigated agriculture, tourism, and retirement. Retirement and tourism are dominant in the northern Coachella Valley, the central portion of the Whitewater River Basin. Agriculture is the dominant economic characteristic of the southern Coachella Valley, or the southern part of the basin. The San Gorgonio Pass economy is dominated by light manufacturing, such as recreational vehicle assembly; this area is the western part of the basin.

ECONOMIC BASE

ECONOMIC ACTIVITY

The general economic strength of the basin is exemplified by strong retail sales and agricultural production. In 1976, retail sales amounted to more than $475 million, an increase of more than 16.3 percent from 1975. The cities in the basin with the highest retail sales are Palm Springs and Indio.

Agricultural production in the basin increased from $103 million in 1976 to more than $107 million in 1977. Major crops contributing to the increase in production value were citrus fruits, cotton, alfalfa, head lettuce, cereal grains, and dates. Each of these crops accounted for more than $10 million in sales in 1977.

LAND USE

Of the more than 1.2 million acres within the Whitewater River Basin, only an estimated 18,200 acres are in urban uses. There are presently about 60,400 acres in agricultural use.

Urban acres in the basin are expected to increase from 18,200 to approximately 30,000 acres in 1990. The increase in urban acres is associated with the increase in population and is expected to come from the vacant lands in the basin.

TRANSPORTATION

Because the economic base of the Whitewater River Basin is comprised of recreation and agriculture, it is served by a variety of transportation modes.

GROUND TRANSPORTATION

Interstate Highway 10 and the Southern Pacific railroad generally parallel the Whitewater River, connecting the basin with its closest major agricultural market, the Los Angeles area, via San Gorgonio Pass. From the basin, the Southern Pacific railroad extends southward into another agricultural area, the Imperial Valley, as do State Highways 86 and 111. I-10 leaves the Whitewater River near Indio and extends eastward towards Phoenix, Arizona. The local road system in the basin is adequate although urbanizing areas are experiencing increasing traffic congestion. Floods and blowsand also interrupt traffic. A major pipeline linking Texas natural gas fields with the Los Angeles market crosses the basin parallel to I-10. The Bureau of Land Management is studying the possibility of using this pipeline for transport of Alaskan oil from the coast to inland areas.

AIR TRANSPORTATION

A number of small airports serve the basin. The major airport, Palm Springs Municipal Airport, which is served by six carriers, services the recreational and retirement community of Palm Springs and its neighbors. This airport has air links to other cities in the southwest area.

HOUSING

Housing in the Whitewater River Basin is as varied and diverse as the people and geography – ranging from ramshackle huts lying in the middle of the desert to high-rise condominiums in Palm Springs.

Mobile homes are popular throughout the basin because of their relatively inexpensive purchase price and low maintenance costs. Condominiums are becoming more popular because of their minimal maintenance and the relative security they offer part-time residents.

Housing ranges in price from less than $20,000 to in excess of $1,000,000. A significant number of homes are valued in excess of $200,000.

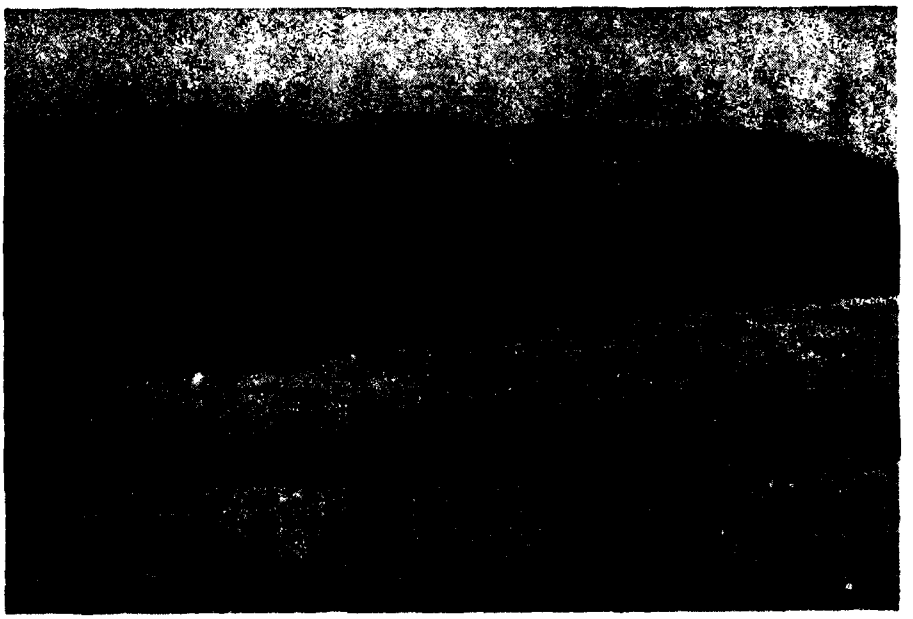
INCOME

The median income in the Whitewater River Basin in 1969 (latest figures available for entire basin) was $6,480. Within the three subareas of the basin, median income was $5,140 in the San Gorgonio Pass area; $7,137 in the northern Coachella

Valley; and $6,516 in the southern Coachella Valley. In 1969, almost 17 percent of the residents in the basin had incomes below the poverty level. The southern, central, and northern part of the basin had poverty rates of 16.6, 12.9, and 21.4 percent, respectively.

EMPLOYMENT

Indio and Palm Springs are the population and retail centers of the Coachella Valley. As such, they are also the employment centers. Employment reflects the type of economy in each – trade, services, and government, in that order, provide employment in Indio; services, trade, and government in Palm Springs. About one-third of the employed persons in the basin are involved in providing services; retail trade employs one-fifth and agriculture employs one-tenth. The following table shows employment by industry for the basin and for its three regions.



WHITEWATER RIVER BASIN, CALIFORNIA

EMPLOYED PERSONS 16 YEARS AND OVER BY INDUSTRY AND REGION – 1970

	Total basin	San Gorgonio	Upper Coachella	Lower Coachella
Total employed, all industries	40,572	7,718	18,230	14,624
Agriculture, forestry and fisheries	4,895	407	503	3,985
Mining	343	31	23	289
Construction	2,783	630	1,266	887
Manufacturing	2,426	1,009	759	658
Durable goods	1,463	736	420	307
Nondurable goods	963	273	339	351
Transportation	995	156	252	587
Communications and public utilities	1,745	324	770	651
Wholesale trade	1,571	290	310	971
Retail trade	8.751	1,523	4,804	2,424
Financial, insurance, and real estate	1,877	236	1,311	330
Services	13,218	2,641	7,434	3,143
Business and repair	1,355	206	783	366
Personal	4,611	873	3,034	704
Medical and health	1,738	545	824	369
Educational	2,702	576	1,185	941
Schools and colleges	2,532	521	1,092	919
Government	2,149	402	974	773
Private	383	119	118	146
Other educational and related	170	55	93	22
Other professional and related	2,812	441	1,608	763
Public administration	1,968	471	798	699

SOCIAL

LIFE, HEALTH, SAFETY

SOCIAL BASE

Three distinct groups comprise the population of the Coachella Valley of the Whitewater River Basin. An affluent segment tends to be financially secure, seeking the healthful, relaxing atmosphere of resort areas such as Palm Desert, Indian Wells, Rancho Mirage, La Quinta, Cathedral City, and Palm Springs. Some members of the Agua Caliente Indian Reservation who own valuable resort land in the area are included in this group. A second segment is largely composed of those workers who provide services for local residents and tourists. A third segment is composed of agricultural workers who maintain the farms, citrus, date, and other fruit orchards, and vegetable truck farms. This group also maintains processing plants, farm implement shops, and other farm-related enterprises. Retired persons who reside in the area are found among each of these segments.

A warm, sunny, healthful climate and an abundance of health-care facilities and personnel are conducive to a high health standard.

Because of the vastness of the area, widely dispersed inhabitants, and a slow and relaxed lifestyle, the area also enjoys a high degree of safety.

POPULATION

The Whitewater River Basin has a 1978 population of 146,100, which is expected to grow to more than 198,000 by the year 1990. The following table shows historical and projected population for the basin and selected cities in the basin.

Historical and projected populations
Whitewater River Basin and selected cities

	1960	1970	Percent change	1978	Percent change	1980	Percent change	1990	Percent change
Whitewater River Basin									
OBERS*	74,800	113,851	52.2	147,600	29.2	153,200	3.8	175,900	14.8
DOF**	74,800	113,851	52.2	151,200	32.4	160,500	6.2	218,000	35.8
CVAG-SCAG***	74,800	113,851	52.2	146,100	27.9	154,100	5.5	198,500	28.8
Banning									
OBERS	10,250	12,034	17.4	13,700	13.8	13,900	1.5	16,000	15.1
DOF	10,250	12,034	17.4	14,100	17.2	14,600	3.6	19,800	35.6
City of Banning	10,250	12,034	17.4	13,600	13.0	14,000	2.9	18,000	28.6
Beaumont									
OBERS	4,288	5,484	27.9	6,572†	19.8	7,100	8.0	8,300	16.9
DOF	4,288	5,484	27.9	6,572†	19.8	7,400	12.6	10,300	39.2
City of Beaumont	4,288	5,484	27.9	6,572†	19.8	7,100	8.0	9,400	32.4
Coachella									
OBERS	4,854	8,353	72.1	9,200	10.1	9,200	0	10,400	13.0
DOF	4,854	8,353	72.1	9,400	12.5	9,700	3.2	12,800	32.0
CVAG	4,854	8,353	72.1	9,100	8.9	9,300	2.2	11,700	25.8

* Office of Business Economics, Research Service, 1972 Series E Projections
** California Department of Finance E-150 Projections
*** Coachella Valley Association of Governments and Southern California Association of Governments
† Special census conducted in 1978
†† Unincorporated in 1960

Historical and projected populations
Whitewater River Basin and selected cities (cont'd)

	1960	- 1970	Percent change	1978	Percent change	1980	Percent change	1990	Percent change
Indian Wells									
OBERS	††	760	NA	2,000	163.2	2,300	15.0	4,000	73.9
DOF	††	760	NA	2,100	176.3	2,400	14.3	4,900	104.2
CVAG	††	760	NA	2,000	163.2	2,300	15.0	4,500	95.7
Indio									
OBERS	9,745	14,459	48.4	20,900	44.5	22,100	5.7	26,600	20.4
DOF	9,745	14,459	48.4	21,400	48.0	23,100	7.9	32,900	42.4
CVAG	9,745	14,459	48.4	20,700	43.2	22,200	7.3	30,000	35.1
Palm Desert									
OBERS	1,295	6,171	390.2	12,700	105.8	14,100	11.0	16,400	16.3
DOF	1,295	6,171	390.2	13,000	110.7	14,800	13.8	20,300	37.2
CVAG	1,295	6,171	390.2	12,600	104.2	14,200	12.7	18,500	30.2
Palm Springs									
OBERS	13,486	20,936	55.2	31,000	48.1	32,900	6.2	39,400	19.8
DOF	13,486	20,936	55.2	31,800	51.9	34,500	8.5	48,900	41.7
CVAG	13,486	20,936	55.2	30,700	46.6	33,100	7.8	44,500	34.4
Rancho Mirage									
OBERS	††	1,298	NA	5,400	316.0	5,800	7.4	8,000	37.9
DOF	††	1,298	NA	5,500	323.7	6,000	9.1	9,900	65.0
CVAG	††	1,298	NA	5,300	308.3	5,800	9.4	9,000	55.2

†† Unincorporated in 1960

POPULATION CHARACTERISTICS

As the basin is divided economically, so is it divided sociologically; the same division of the basin that is used in the economic and development analysis is applicable to this part of the analysis of the basin.

Age - The median age for the entire basin in 1970 was 35 years. This median age is contrasted with the median ages for the northern, southern, and central parts of the basin which are 38, 23, and 47 years of age, respectively.

Education – Only 56.7 percent of those in the basin over 25 years of age have graduated from high school. The San Gorgonio Pass area has a 49.9 percentage of graduates; the upper and lower Coachella Valley areas have a 69.4 percentage and a 38.2 percentage, respectively.

Racial and ethnic – Whites comprise 94 percent of the population of the basin; the remainder is black (3.2 percent) and other races (2.3 percent). The Hispanic ethnic group, some members of which are considered to be included also in each of the other groups listed above, accounts for 26.2 percent of the total population.

COMMUNITY CHARACTERISTICS

The economy of the Coachella Valley depends upon two very different types of activity – agricultural activities in the lower valley and resort-recreational-retirement oriented activities in the upper valley. Consequently, the characteristics of the communities in each area differ to a marked degree. Indio, the hub of the agricultural area of the lower valley, is primarily a farm-oriented community. Agricultural activities and their related services and trade provide a source of income for farm workers, store owners, and public employees. The communities of Coachella, Thermal, and Mecca are included in this category.

Palm Springs, Rancho Mirage, Palm Desert, and Indian Wells are communities that attract the affluent (retired or otherwise), the socially prominent, and the tourist. La Quinta is considered to be less affluent, although some areas are comparable in development with the resort-oriented communities just mentioned. Resort and recreational activities almost without parallel are available to meet the needs and desires of residents and visitors. The work force in these communities represents a racial mixture that usually seeks housing and recreational facilities in less expensive adjacent areas. Less affluent retired and other permanent residents who seek a share of the desert environment are in somewhat the same situation.

Banning and Cabazon to the north are rural communities populated in part by retirees and members of the Morongo and Cabezon Indian tribes. Some of these residents commute to Palm Springs and other more affluent areas for employment.

The affluent segments tend to have a higher degree of cohesiveness than those less affluent areas. This may be due in part to the difference in the amount of time that is available for leisure pursuits and recreational and community activities.

DISPLACEMENT OF PEOPLE

None of the alternatives that were considered in this Stage 1 study are expected to require relocation of people.

ESTHETICS

The contrast between the desert environment and the large areas devoted to agriculture, citrus and date groves, and landscaped housing developments is found throughout the Coachella Valley. These restful oases, together with a warm, smog-free atmosphere, provide a climate that is healthful, pleasing, and relaxing for residents and visitors alike.

SOCIO-CULTURAL FEATURES

The Agua Caliente Indians have lived and hunted for hundreds of years in the canyons surrounding Palm Springs and have bathed in the hot mineral springs that are located on Agua Caliente Indian Reservation land in the city. Today, one of the most beautiful spas in the country is built over an old Indian bathing pool. Nearby, are Palm and Andreas Canyons where visitors can observe Indian grinding stones, unusual rock formations, and caves once used by these Indians.

The Palm Springs aerial tramway carries passengers on its 8,000-foot ascent from the desert base of Mt. San Jacinto to its forested summit. The College of the Desert claims to have one of the most beautiful campuses in the world. The Palm Springs Desert Museum has become a center of social as well as cultural life.

Morton Botanical Garden – an historical landmark established in 1938 – has a display of 2,000 varieties of desert plants collected from throughout the world. The garden serves as a sanctuary for many varieties of birds and wildlife.

A welcome phenomenon in the wide expanse of desert terrain is the Salton Sea. This large body of salt water – about 235 feet below sea level – is a main attraction for visitors to the Whitewater River Basin. Boating, fishing, water skiing, camping, and other recreational activities are enjoyed by hundreds of recreationists.

ENVIRONMENTAL

PHYSIOGRAPHICAL

ENVIRONMENTAL BASE

The Whitewater River Basin is located in the northwestern end of the Salton Trough, a landward continuation of the Gulf of California. The bordering mountain ranges consist mainly of metamorphic and igneous rocks, whereas the Coachella Valley is filled with primarily land-laid sedimentary deposits. Elevations in the basin range from 235 feet below sea level at the Salton Sea to 11,485 feet at San Gorgonio Peak. These are several active faults within the basin.

BIOLOGICAL

The biological environment of the study area is discussed in the following subparagraphs.

BOTANICAL

The Coachella Valley lies within the Colorado Desert, which is the northwesternmost portion of the Sonoran Desert. The predominating vegetation type along the Coachella Valley is creosote bush scrub. This plant community is dominated by creosotebush and burrowbush and intermixed with various species of cholla cactus. Species diversity is low and spacing between shrubs is great. Other important plant community types found in the study area include saltbush scrub, desert sand dunes, desert wash (riparian), palm oasis, alkali sink (found around the Salton Sea), and salt water lake (Salton Sea).

Nine plant species considered to be rare and endangered by the State of California and at least one plant species classified as rare and endangered by the Federal Government are found within the basin. These plant species are listed here:

Rare and endangered plants – State of California

Ayenia compacta Rose (Sterculiaceae)
(Coryphantha vivipara Davenport ex Underwood (Cactaceae) var alversonii
Ditaxis adenophora (Gray) Pax & Hoffm. (Euphorbiaceae)
Ditaxis californica (Bdg) Pax. & K. Hoffm. (Euphorbiaceae)
Hemizonia mahovensis Keck. (Compositae)
Monardella robinsoni Epl. in Munz (Lamiaceae)
Muilla clevelandii (S. Wats.) Hoover (Amaryllidaceae)
Penstemon californicus (M. & J.) Keck (Scrophulariaceae)
Astragalus lentiginosus Dougl. var. borreganus Jones (Fabraceae)

Rare and endangered plants – State of California and Federal

Salvia columbariae Benth. var. ziegleri Munz (Lamiaceae)

Proposed additions to rare and endangered or very rare

Celtis reticulata Torr. (Ulmaceae)
Machaeranthera cognata (Hall) Cronq. & Keck (Compositae)
Salvia greatai Bdg. (Lamiaceae)

Those rare and endangered plant species which would be affected by study proposals will be identified during Stage 2 planning.

ZOOLOGICAL

Within the regional study area, which includes habitat extremes from the Salton Sea to the desert slopes of the San Bernardino Mountains, a diversity of wildlife is found, including desert tortoise, sidewinders, many lizard species, ravens, water-associated birds, kangaroo rats, jackrabbits, kit fox, and Desert Bighorn Sheep. Ten animal species considered to be rare and endangered by the State of California and/or the Federal government are known to occupy the basin. Desert tortoise and the Bighorn Sheep are included in this group. A list of these rare and endangered animals follows.

The following fully protected animals, classified as rare and endangered by the State of California and the Federal Government, are known to occur in the Whitewater River Basin:

Amphibians

Endangered – Desert Slender Salamander (Federal & Calif.)

Reptiles

Rare – Southern Rubber Boa (Calif.)
Threatened – Desert Tortoise; San Diego Horned Lizard; Silvery Legless Lizard (fully protected) (Federal & Calif.)

Birds

Endangered – Yuma Clapper Rail (Federal & Calif.)
Fully protected – Golden Eagle (Federal & Calif.)

Mammals

Fully Protected – Desert Bighorn Sheep; Ring-tailed Cat (Calif.)
Rare – Peninsular Bighorn Sheep (Federal & Calif.)

LIFE ZONES

The basin contains nine proposed and existing wildlife refuges and wilderness areas to be protected under State of California and/or Federal law.

CULTURAL

The basin is located within the historical territory of the desert branch of the Cahuilla, a Shoshonean language tribe of the Uto-Aztecan family. Prehistoric human occupation of the Coachella Valley appears to be linked to fluctuations in a large freshwater lake of which the Salton Sea is a remnant. This freshwater lake, Lake Cahuilla, was formed around A.D. 900 by the flow of the Colorado River into the basin. The lake remained stable until A.D. 1200 when the Colorado River changed its course and resumed its flow into the Gulf of California. About a century later, the lake reformed with a shoreline about 42 feet above sea level. This ancient lake would have provided abundant food and natural resources in comparison to the desert present today. Numerous archeological sites have been discovered along the shoreline of the ancient Lake Cahuilla. As the lake dried around A.D. 1500, the population moved to the higher elevations of the basin where springs and wells supplied water. Local Cahuilla groups such as those on the Agua Caliente Indian Reservation are descendants of the prehistoric groups who occupied the ancient lakeshore.

RESOURCES MANAGEMENT PROBLEMS

The needs expressed by the public were analyzed to determine if they can be achieved by water and related land resources management. Floodwaters from the Whitewater River and its tributaries have caused widespread damage to residential and business property and agricultural land and have interrupted transportation and communication facilities and community activities throughout the Coachella Valley. Tourism, a major contributor to the economy of the city of Palm Springs and nearby areas, has, on occasion, been severely affected.

In addition to flood control problems, other related resources management problems are water conservation, recreation, water quality, air quality and blowsand.

PUBLIC CONCERNS

IDENTIFICATION OF PUBLIC CONCERNS

The control of floods originating in the mountainous areas surrounding the Coachella Valley has been a major concern for many years. Significant floods occurred in the basin in November 1965, December 1966, January and February 1969, and September 1976.

Channel capacities of most streams in the valley areas are too small for the control of large floods. Existing flood control works do not provide adequate protection for many developing areas in the valley.

The Riverside County Flood Control and Water Conservation District (RCFCWCD) recommends control of floods in the upper basin. They point out that upstream control would greatly reduce potential damages in the Palm Springs area, especially to road crossings and private property. RCFCWCD is particularly concerned about the need for the control of floods originating in the mountainous area along the Whitewater River upstream from Interstate Highway 10 and along the San Gorgonio River above State Route 111. Mission Creek has also been a source of continuing damages to an area west of Desert Hot Springs.

Although local interests recognize the need for flood control, construction of flood control works of the necessary magnitude, as stated by the RCFCWCD, is beyond their financial capability.

PROBLEMS

PROBLEMS AND NEEDS

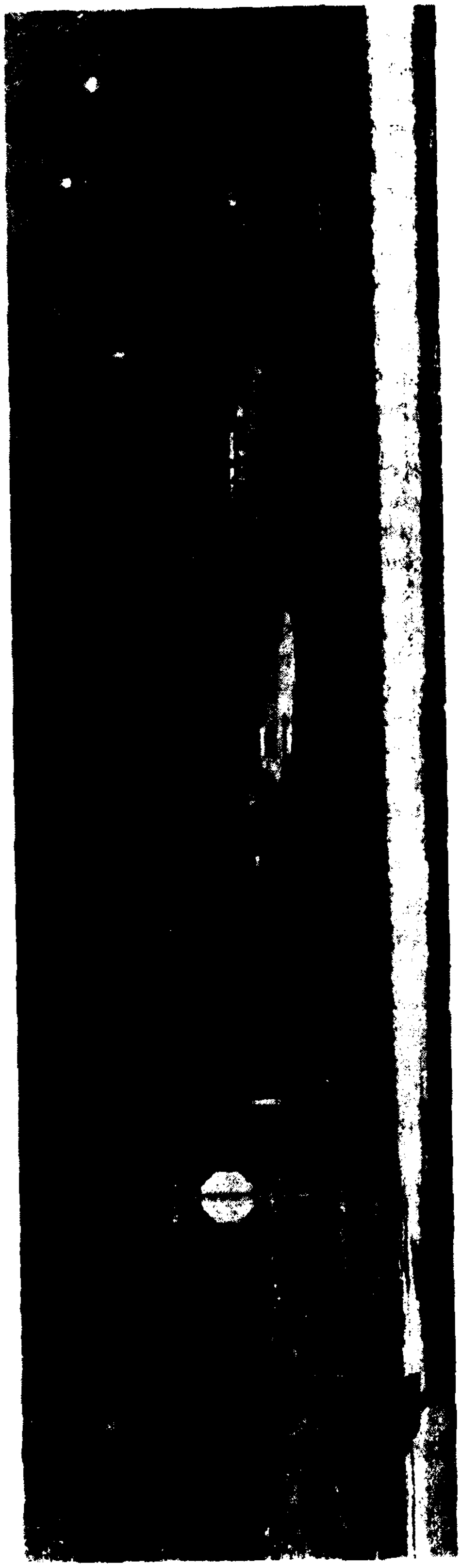
FLOOD PROBLEM

There are two different types of flood problems within the Whitewater River Basin. On the Whitewater River tributaries, flooding of alluvial fans threatens inhabitants along Smith Creek, Jenson Creek, Stubbe Canyon, Mission Creek and in the Rancho Mirage, Palm Desert, Indian Wells, La Quinta, Thousand Palms and Oasis areas. The high intensity of floods and randomness of flood path selection on these fans create an unusual hazard to inhabitants. Flooding along the Whitewater River main stem is more predictable but nevertheless severe. Communities along the main stem subject to flooding include Palm Springs, Cathedral City, Rancho Mirage, Palm Desert, Indian Wells, Indio, Coachella, and Mecca, as well as the large, highly productive agricultural area in the lower Coachella Valley.

In order to protect resort communities established on the alluvial fans, local agencies have constructed flood control works on Cottonwood Canyon, Palm Canyon Wash, Tahquitz Creek, and Baristo Creek in Palm Springs; Cathedral City channels in Cathedral City; Magnesia Spring Wash in Rancho Mirage; Palm Valley Creek and Dead Indian Creek in Palm Desert; Deep Canyon in Indian Wells; La Quinta Creek in La Quinta; and East and West Wide Canyon Dam and dike systems near Desert Hot Springs. In addition, channel and levee improvements have been constructed along most of the reach of the Whitewater River from the Palm Canyon confluence through the lower Coachella Valley to the Salton Sea. However, some of these existing flood control works may not control major floods and so problems remain.

Other flood control improvements involve those constructed to protect the U.S. Bureau of Reclamation Coachella Branch of the All-American Canal, which passes through the northeast side of the Coachella Valley from the Salton Sea to just north of Indio, then crosses the valley and ends at Lake Cahuilla southeast of La Quinta. The Bureau has built a series of detention dikes along the northeast side of the valley to protect the canal from mountain runoff on that side of the valley. The Bureau and the Coachella Valley County Water District have constructed dikes and an evacuation channel which provide protection for the irrigation works and related improvements against damage as the result of floods from the Santa Rosa Mountains.

Historical records indicate that a large winter flood has occurred at least one or more times during almost every 10-year period since 1825. No records of damage from floods prior to 1916 are available; however, little damage probably occurred because of the lack of development in the overflow area at the time of these floods. The 1916 flood probably was the most devastating of all the floods of the Coachella Valley, although the valley had far fewer developed areas to be damaged then than it has now.



The largest recorded flood on the Whitewater River occurred as a result of a general storm in 1938. Its peak discharge near Point Happy was estimated to be 29,000 cubic feet per second. The estimated damage was slightly more than $2,000,000, mainly to roads and bridges, railroads and bridges, commercial and agricultural properties, and utilities. Based on present prices and stage of development, damage from such floods, if they should occur now, would be many times that amount.

The November 1965 flood caused damage estimated at about $3,030,000 to roads and bridges, railroads and bridges, residential, commercial and agricultural properties, utilities, and flood control and drainage facilities. A peak discharge of 14,100 cubic feet per second was estimated for the Whitewater River at Indio. The December 1966 flood, which caused substantial damage, had an estimated peak discharge of 4,960 cubic feet per second at the same point.

Although the January and February 1969 floods in Riverside County were not as great as the 1938 flood, they were the most damaging of record (at that time), mostly because of the development that had taken place in the county since 1938. Flooding was severe in the cities of Banning, Cabazon, and Palm Springs. Most north-south roads crossing the Whitewater River were inundated by floodwaters and closed to traffic. Residents were evacuated in the cities of Cabazon and Palm Springs. Water supply facilities for the city of Cabazon were destroyed. Peak discharges of 16,200 cubic feet per second (January flood) and 13,500 cubic feet per second (February flood) were estimated for the Whitewater River at the community of Whitewater. Damages in the Whitewater River drainage area were estimated to be $11,700,000.

The floods of September 1976 caused damages estimated at about $18,000,000 in the Whitewater River Basin, $9,000,000 of which occurred in the communities of Palm Desert ($6,290,000), Rancho Mirage ($180,000), and Indian Wells ($2,600,000). Peak discharges of 8,900 and 7,100 cubic feet per second were recorded at Dead Indian Creek and at Deep Canyon, respectively, both near Palm Desert. The resulting overflow caused extensive damage to about 40 homes in Rancho Mirage, about 500 homes in Palm Desert, and about 55 homes in Indian Wells. In addition, business properties, mobile home parks, golf courses, utilities and roads were damaged. Many swimming pools and yards in the residential areas were filled with mud, silt, and debris. Overflow caused extensive damage to irrigation and flood

control facilities in the highly developed agricultural area in the lower Coachella Valley. Large amounts of sediment deposited on cropland in this area severely damaged citrus, date, fruit, and vegetable crops. Other communities that suffered flood damages included Palm Springs, Indio, Coachella, and Desert Hot Springs. At least three lives were lost during the floods.

BLOWSAND PROBLEM

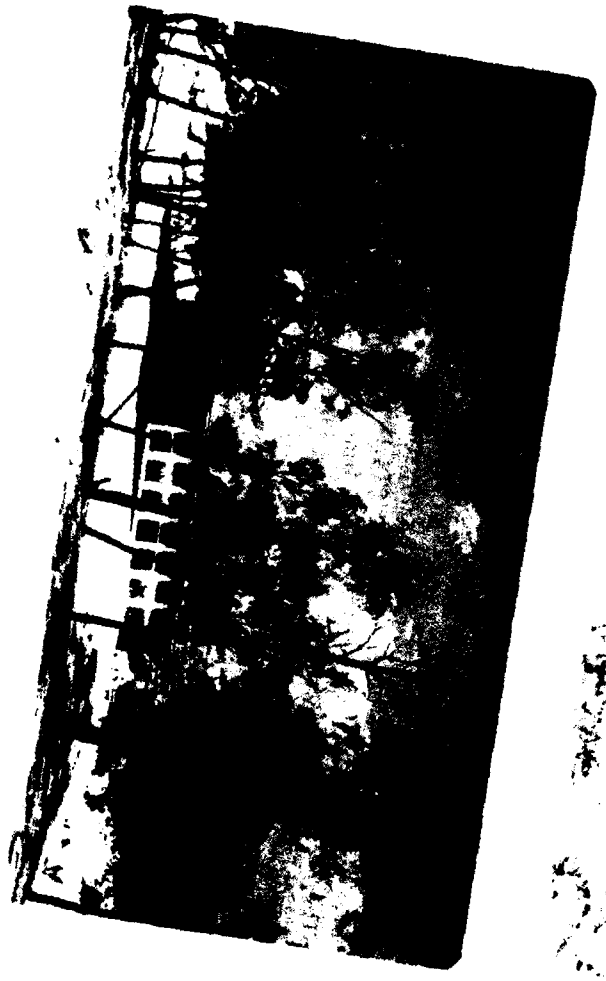
A signficant blowsand problem exists in the upper portion of the Coachella Valley extending from the confluence of the San Gorgonio River with the Whitewater River into the community of Indio, a distance of about 30 miles.

Waterborne sediments deposited on the flood plains of the Whitewater River and its tributaries and soil from other disturbed bare land surfaces are picked up and carried eastward and southeastward by strong winds emerging from San Gorgonio Pass.

Coachella Valley Association of Governments (CVAG) studies indicate that blowsand damages are most severe immediately following the deposition of new sediment on the plain by major floods and diminish in intensity during flood-free periods.

Blowing sand creates a health hazard; it damages land, residential and commercial buildings, and motor vehicles; accumulates in roads, driveways, yards and patio areas; fills drainageways and plugs culverts and bridges. Removal is costly and repetitive. Philip Abrams Consulting Engineers, Inc., in a report entitled "Study of Benefit Assessments Resulting from Whitewater and Cabazon Dams" estimated the blowsand damages for 1975 as follows: Property – $7,790,000; automobiles – $5,719,000; streets – $600,000. The total estimated damages of $14,100,000 included sandblasted windows and paint of homes and business buildings; damaged roofs, walls, and fixed structures; sandblasted glass and painted surfaces of automobiles; and the cost of removal of sand from highways and streets. Note the blowsand condition shown in the following photograph.

The Coachella Valley Association of Government (CVAG) has prepared a report, "Blowsand Control and Protection Plan," dated June 1977, addressing the blowsand problem and methods of controlling the blowing sand. The report contains a suggested blowsand control program. Briefly, the plan would consist of a local ordinance program



(Photo courtesy of Gary Gruber, Rancho Mirage)

implementing safety, open space, and conservation measures; regulation of proposed developments within blowsand hazard zones; establishment of blowsand control devices along critical transportation corridors; and measures to enhance and protect natural ground cover.

The following information has been taken, in part, from the Coachella Valley Association of Governments (CVAG) report dated 23 May 1978 on the preliminary assessment of non-flood related benefits associated with the Whitewater River. The report concludes that significant reduction of blowsand damages to Coachella Valley residents would be associated with construction of flood control works on the Whitewater River.

CVAG BLOWSAND ASSESSMENT

CVAG assessment of non-flood related benefits – Geological indications are that the present sand transport process has been ongoing in essentially the same manner in the Coachella Valley for the past 10,000 to 12,000 years. At present, the alluvial plain of the Whitewater River extending from Windy Point to Indian Avenue in Palm Springs and the coalescing alluvial fans along the base of the Indio Hills constitute the primary source areas. Waterborne sediments deposited on the flood plain of the Whitewater River are transported down-valley by strong winds emerging from San Gorgonio Pass and are subsequently deposited in the southern and eastern parts of the region. This condition has existed about 9.1 percent of the time over a 10-year period from 1958 through 1967 near Thousand Palms where a supply of transportable sand has been continuously available. The 9.1-percent occurrence is believed to be reasonably applicable over the upper part of the region.

Complete elimination of the transport of sand by wind in the Coachella Valley would require control of both the sand already in the valley, as well as that yet to be delivered. Despite the obvious importance control of sand already in the valley would have upon that objective, preventing the further influx of new sand would be equally as important over the short term and more important overall.

The Whitewater-San Gorgonio River system is responsible for the major part of the blowsand. Positive control of this source would materially lessen the efforts required to effectively control sand already in the valley. Although a significant reduction in sand transport would extend over the entire intermediate transport area almost immediately, the virtual complete elimination of all further sand transport would progress downwind at a rate of about 1 mile per year

until after the first 5 years when the upwind edge of the large sand accumulation area would be reached. Beyond this point, previously accumulated sand would be available and the downwind progression of surface stabilization would be slowed considerably. Blowsand activity would be effectively eliminated from the Whitewater River flood plain to Vista Chino within 5 years and to 2 miles further downstream to Ramon Road within 20 years after the prevention of further sand transport across Indian Avenue.

The economic cost of residing in or traveling across an active blowsand region is enormous. Losses sustained as a direct result of blowing sand include: Damage to automobiles by sand blasting of glass and painted surfaces; damage to railroad rolling stock and permanent facilities; damage to real estate directly related to sand accumulation or destruction of surfaces and equipment; damages to residential properties within the blowsand hazard zone; maintenance and removal costs along roadways and railroads associated with sand accumulation; and damages to signs and utility poles. Other losses are less obvious; their financial impact incalculable. Sandstorms impair mobility, reduce manpower productivity, retard tourist trade, reduce visibility, and expose Coachella Valley residents to health effects not fully understood, but generally deemed hazardous.

Of these damages whose elimination can be associated with the construction of further flood control works on the Whitewater River, those directly related to vehicles, road maintenace, and private property lend themselves to the definitive financial assessment. Cost savings would include: A reduction of vehicular damage, a reduction of sand related road maintenance expenses, a reduction of private property damage, increased water conservation, and Coachella Valley air quality improvements.

Blowsand reduction in the Coachella Valley that would result solely from flood control measures along the Whitewater River is highly uncertain. The following table, included as part of the CVAG assessment report, indicates benefits that were estimated by CVAG to result from blowsand reduction as a consequence of the construction of upstream flood control works.

PRELIMINARY ASSESSMENT OF NON–FLOOD RELATED FINANCIAL BENEFITS

	YEARLY BENEFIT AFTER FIVE YEARS	YEAR BENEFIT AFTER TWENTY YEARS
REDUCTION OF VEHICULAR DAMAGE		
1. Indian Avenue Motorists	$ 177,390	$ 233,235
2. Palm Drive Motorists	134,685	177,390
3. Vista Chino Motorists	0	105,120
4. Date Palm Motorists	0	144,540
5. Ramon Road Motorists	0	249,660
Subtotal	$ 312,075	$ 909,945
REDUCTION OF SAND RELATED ROAD MAINTENANCE		
6. Indian Avenue	$ 250*	$ 250
7. Palm Drive	$ 1,800	$ 1,800
8. Vista Chino	$ 0	450
9. Date Palm Drive	$ 0	$ 2,000
10. Ramon Road	$ 0	$ 2,000
11. Palm Springs Panorama	$ 0	$ 10,000
Subtotal	$ 2,050	$ 16,500
REDUCTION OF PRIVATE PROPERTY DAMAGE		
12 Southern Pacific Railroad	0	$ 30,000
13. Residential Dwellings	0	$ 11,250
Subtotal	$ 0	$ 41,250
WATER CONSERVATION POTENTIAL		
14. Increased Water Percolation	$ 75,000	$ 75,000
Subtotal	$ 75,000	$ 75,000
TOTAL YEARLY BENEFITS	$ 389,125	$ 1,052,695

* Effective immediately upon completion of construction.

CORPS BLOWSAND ASSESSMENT

Corps comments on CVAG assessment – CVAG assessment of blowsand damage reduction assumes no transport of blowsand material across Indian Avenue near Palm Springs. The C-VAG report presented conclusions, but did not provide adequate information to support these conclusions. We must establish a casual relationship between floodflows and blowsand damages. We must demonstrate that blowsand damages do, in fact, reduce during flood-free periods on the basis of the same wind conditions.

With effective sand transport and sand reduction models, benefits for the reduction of blowsand damages could be developed. The actual models to evaluate the blowsand damage reduction would require development and testing for accuracy.

Blowsand benefits should be considered in the evaluation of the economic performance of the various alternatives on the main stem of the Whitewater River. This recommendation is made with the implicit understanding that methods for evaluation would have to be developed by this District.

It is indicated in the report that road maintenance costs are reduced by 90 percent (from $7,000 to $600 annually) between periods of flooding deposition. The Los Angeles District after considering the information provided by the CVAG report concurs in the conclusion that further studies on the blowsand problem are warranted.

OTHER

WATER QUALITY AND CONSERVATION

Inhabitants of the arid Whitewater River Basin have always been concerned about water problems. The greatest use of water in the Whitewater River Basin is for irrigated agriculture in the lower Coachella Valley. For this purpose the Coachella Branch of the All-American Canal was completed in 1949 to import Colorado River waters. More recently opened agricultural lands, higher on the alluvial fans flanking the valley floor, are irrigated by ground water. Municipal and industrial users in the basin rely primarily on the high-quality ground-water supply which underlays much of the valley floor. Presently the upper portion of the valley, that which supplies the fast-growing cove community area, has a significant net overdraft of ground water despite

current spreading and percolation of Colorado River waters in the windy point area. Conservation and replenishment of existing ground-water supplies are gaining credibility as issues in this area. New municipal wells must be drilled hundreds of feet deeper than before in search of water.

Point source polluters of surface waters—largely municipalities—now have secondary treatment of discharges. Non-point source pollution is currently under study as a part of the Public Law 92-500, section 208 program. The major non-point source appears to be return flows from irrigation in the lower valley. Management of this resource to improve the quality of the Salton Sea is a high priority in the development of a water quality plan for the basin. Maintenance of the ground-water quality of the basin is also important. Ground-water recharge by Colorado River waters, high in total dissolved solids, is currently degrading the ground-water supply. Greater percolation of flood runoff, conservation by water users, and construction of the proposed canal from the Lake Perris reservoir into the valley would probably increase water quality and quantity.

AIR QUALITY

Air quality in the inhabited areas of the Whitewater River Basin does not comply with 1977 Federal air quality standards for oxident and particulate levels. The area, therefore, must devise an Air Quality Maintenance Plan aimed at attaining satisfactory levels in oxidents and particulates as well as maintaining satisfactory air quality in other parameters. The precise relationship between particulate levels and the blowsand condition is uncertain though particulate levels are generally higher when sand is moving. Control of sand may affect air quality.

RECREATION

Portions of the study area are known for their recreation opportunity. The availability of private golf courses in the cove communities, for example, is probably unsurpassed anywhere.

There is much opportunity for hiking, camping, hunting, and related activities in the surrounding foothills and mountains. The need for water-based recreation, always in short supply in arid areas, is primarily met in the study area by use of many private and some municipal swimming pools, the Salton Sea and Lake Cahuilla. The primary purpose of Lake Cauhilla is to act as a terminal reservoir for the Coachella

Canal. Developed as a recreation area with swimming and fishing, it is immensely popular, particularly for those who cannot afford swimming pools and extended trips to other, more distant reservoirs and rivers. The salinity of the Salton Sea detracts from its attractiveness for water-contact recreation.

PLANNING OBJECTIVES

The main planning objective of this study is the provision of flood control for communities in the Coachella Valley. Other current planning objectives include water conservation, recreation, air quality, blowsand reduction, preservation of archeological features and fish and wildlife habitat, and wastewater and surface and ground-water quality control. Other water resource planning objectives suggested by the community through public involvement programs will be considered.

Specifically the planning objectives as forseen at this time include:

FLOOD DAMAGE REDUCTION

Flood damage in the Whitewater River Basin could be reduced by constructing channels or reservoirs; regulating flood plain development; and floodproofing.

WATER CONSERVATION

There is an abundance of high quality ground water in the basin, but urban growth will continue to deplete ground-water supplies. Reservoirs, combined with spreading areas, could help replenish the ground-water basin.

RECREATION

Recreational needs could be provided for by incorporating hiking, bicycling, and equestrian trails and other recreational activities, where possible, into flood control facilities.

BLOWSAND REDUCTION

Partial blowsand reduction might be obtained by constructing a flood control dam that would reduce the supply of riverborne sediment. Further, floodflows disturb downstream vegetative cover, exposing sediment to wind erosion. Additional studies are needed to determine the impact of the dam on the blowsand problem.

CULTURAL RESOURCES

Any impacted cultural resource features might be protected either through mitigation or preservation, or by providing a cultural interpretative area for the protection, study, and viewing of unique archeological resources.

FISH AND WILDLIFE HABITAT

Mitigation and enhancement may be proposed for the protection of fish and wildlife habitat. The Whitewater Canyon Dam might affect the operation of the fish hatchery located downstream from the site.

WASTE-WATER QUALITY CONTROL

Water quality might be improved by the control of non-point or diffused sources of pollution. In addition, control of floodwaters might improve surface water quality.

AREAS OF INVESTIGATION

AREAS OF INVESTIGATION

As stated previously, the Riverside County Flood Control and Water Conservation District and the Coachella Valley County Water District have requested consideration of flood control measures along specific streams and problem areas in the basin. Preliminary studies were performed on those areas to identify areas that should be studied further.

Preliminary findings were presented to the public in the information pamphlet (May 1978) and at two public meetings on 15 June 1978. In general, there was public support for continuing further studies along the Whitewater River, Palm Desert, Indian Wells, and La Quinta. There was a desire to expedite the study.

The determination of the desirability of conducting further studies for the areas under investigation was based on consideration of existing development only. It was concluded that if the benefit/cost ratio approached unity that consideration of additional benefit categories such as benefits resulting from future development, location benefits, area redevelopment benefits, and advance replacement of bridges, the benefit/cost would improve so that there would be a reasonable prospect of a favorable project with more detailed study.

The following is a detailed discussion of the findings to date.

Whitewater River – main stem

The flood problems along the main stem of the Whitewater River result from floodwaters exceeding the capacity of the existing channel and inundating areas adjoining the eastern limits of the city of Palm Springs and the communities of Indio, Coachella, and Thermal, and the highly developed agricultural area in the lower Coachella Valley. The present value of improvements subject to flood damages is estimated at $912 million, consisting of $520 million for residential property, $340 million for commercial property, and $52 million for agricultural property. Consideration was given to four alternative plans to provide flood protection along the river. They are: (1) two dams – one on the San Gorgonio River near Cabazon and the other on the Whitewater River near Whitewater Canyon; (2) a dam on the Whitewater River near Windy Point; (3) a dam on the Whitewater River near Garnet Hill; and (4) channel improvements along the Whitewater River (see pl. 2).

The four alternative plans are discussed below:

Dams on the San Gorgonio River near Cabazon and on the Whitewater River near Whitewater Canyon – These dams would control a 195-square-mile drainage area. The Cabazon dam would be 110 feet high and the Whitewater dam would be 175 feet high. First cost of the two dams would be about $54 million. The average annual project cost would amount to about $3.6 million; the average annual benefits would be $2.0 million. The benefit/cost ratio would be 0.6.

Dam on the Whitewater River near Windy Point – This dam would control a 261-square-mile drainage area. The dam would be 130 feet high. First cost would be about $48 million. The average annual project cost would amount to $3.2 million; the average annual benefits would be $2.2 million. The benefit/cost ratio would be 0.7.

Dam on the Whitewater River near Garnet Hill – This dam would control a 577-square-mile drainage area. The dam would be 90 feet high. First cost would be about $77 million. The average annual project cost would amount to $5.1 million; the average annual benefits would be about $2.5 million. The benefit/cost ratio would be 0.5.

Channel improvement from Point Happy to Salton Sea – The channel would extend along a 25-mile reach of the Whitewater River from Point Happy to the Salton Sea. The total value of improvements in the standard project flood overflow area that would be subject to flood damages is estimated at $700 million. First cost would be about $110 million. The average annual project cost would amount to $7.3 million; the average annual benefits would be $1.4 million. The benefit/cost ratio would be 0.2. In subsequent studies, incremental analysis for various channel lengths along the Whitewater River will be considered.

Preliminary studies indicate that flood reduction benefits would not, by themselves, justify a project. However, if area redevelopment benefits are included in the justification of the reservoirs, some projects would probably be economically justified.

In addition, the Coachella Valley Association of Governments (CVAG) task force committee on the blowsand problem has indicated that flood control dams, especially at the Garnet Hill site, would have a substantial impact on the blowsand problem.

Smith Creek (near Banning)

Smith Creek, which drains an area of about 27 square miles, is in the San Gorgonio Pass between the San Bernardino Mountains on the north and the San Jacinto Mountains on the south. The stream, which originates in the foothills of the San Bernardino Mountains, flows southward and eastward to its confluence with the San Gorgonio River southeast of the city of Banning.

Preliminary investigation of flood problems along Smith Creek indicated that developments along a 3-mile reach just upstream from I-10 would be subject to damage. The present value of property in the overflow area is estimated at $10.8 million.

A combination channel and levee plan 2 miles long would be required at an estimated cost of $1.3 million. Average annual project cost would amount to $86,000; average annual benefits would be $20,000. The benefit/cost ratio would be 0.2. The cost would exceed the anticipated benefits. We conclude, therefore, that further studies of this area are not warranted at this time.

Jenson Creek (near Cabazon)

Jenson Creek, which drains an area of about 4.2 square miles, is a tributary to the San Gorgonio River.

Preliminary investigation of the flood problems along Jenson Creek indicated that the present value of property that is subject to damage is about $2.8 million. Average annual benefits would amount to $3,000. The benefits accruing from the construction of the 1-mile channel that would be required to control the floodflows would not exceed the construction costs. A flood control project along Jenson Creek is therefore not justified and further studies are not warranted at this time.

Stubbe Canyon

Stubbe Canyon, which drains an area of about 6.7 square miles, originates in the foothills of the San Bernardino Mountains and joins the San Gorgonio River about halfway between Cabazon and Whitewater.

Preliminary investigation of flood problems along Stubbe Canyon indicated that property valued at about $760,000 in the 2-mile reach above I-10 would be subjected to flood damage. Average annual benefits would amount to $1,000. The benefits accruing from the construction of the 2 miles of levees that would be required to control floodflows would not exceed the construction cost. A flood control project along Stubbe Canyon is therefore not justified and further studies are not warranted at this time.

Mission Creek

Mission Creek, which drains a 36-square-mile area of the eastern slope of the San Gorgonio Mountains, originates in the same area as the Whitewater River in the San Bernardino Mountains. From its origin, it flows southeastward for about 25 miles to the Whitewater River. Enroute, its course leads it through the relatively flat desert west of Desert Hot Springs. The stream then flows southeastward across the sandy desert to the east end of Garnet Hill.

Preliminary investigation of the flood problem along Mission Creek indicated that development valued at about $6.5 million along a 2-mile reach just upstream from I-10 would be subject to flood damages.

The cost of providing protection, consisting of concrete channel for a distance of about 1 mile and levees for 1 mile, would amount to about $2.9 million. Average annual project cost would amount to $190,000; average annual benefits would be $2,000. The benefit/cost ratio would be .01. Therefore, flood control structures to provide protection along Mission Creek alone are not economically justified. However, an alternative for controlling floodwaters along the main stem of the Whitewater River, as discussed previously, would be a dam near Garnet Hill. In order for this alternative to be effective, diversion of floodflows from Mission Creek to the suggested Whitewater River dam near Garnet Hill would be required. If the floodflows from Mission Creek were not diverted to the suggested dam, erosion problems along the dam embankment could occur. Therefore, further studies of flood control structures on Mission Creek may be warranted as part of a comprehensive plan for the Whitewater River.

Thousand Palms (Edom Area)

The present unincorporated town of Thousand Palms was known for many years as Edom. The Edom area is a triangular shaped region of the Coachella Valley extending from near Indio in a northwestward direction for about 15 miles. The area lies between the Southern Pacific railroad and the Indio Hills. The area is subject to stormwater from the Indio Hills and from a number of washes and canyons draining the San Bernardino Mountains that flow through the Indio Hills to the area. Pushawalla Canyon, Thousand Palms Canyon, and Long Canyon are the principal contributors of the stormwater flows.

Preliminary investigation of the Edom area indicated that development valued at $6.5 million would be subject to flood damages.

A flood control system proposed in the August 1964 report by Bechtel Incorporated prepared for the Coachella Valley County Water District was reviewed. The plan would consist of collector channels which would drain into a detention basin and then into the Whitewater River main channel. The total channel system length would be about 10 miles.

The total construction cost for the plan is estimated at $27.8 million. This cost would not be justified by the anticipated reduction in flood damages. Average annual project cost would amount to about $2.0 million; average annual benefits would be $150,000. The benefit/cost ratio would be less than 0.1. Therefore, further studies in the Thousand Palms area are not warranted at this time.

Rancho Mirage

Rancho Mirage is located halfway between Palm Springs and Indio. Flood control channels provide limited protection for this community from stormwaters issuing from Magnesia Spring Canyon.

Preliminary investigation of the flood problems along West and East Magnesia Spring Canyons indicated that development valued at $20.0 million would be subject to flood damage.

The construction of about 4 miles of channel to control floodwaters along these canyons was considered. The channel would have to originate in the headwaters of the canyon even though no development exists in this upper one-half of the study reach. The work in the upper reach is required because, otherwise, the floodflows would overtop the existing levees near the headwaters. The total required construction cost for flood control would be about $2.3 million. Such cost would be greatly in excess of the resultant benefits. Average annual project cost would amount to $186,000; average annual benefits would be $68,000. The benefit/cost ratio would be 0.4. A flood control project in Rancho Mirage is therefore not justified and further studies along these streams are not warranted at this time.

Palm Desert

Palm Desert, often referred to as the "Winter Golf Capitol of the World," is located about 10 miles west of Indio. Stormwater channels divert floodwaters from Dead Indian Creek, Carrizo Creek, Cat Creek, and Deep Canyon around this community.

Floodwaters from Cat Creek, Dead Indian Creek, and Carrizo Creek would cause damages to property presently valued at about $168.0 million in the Palm Desert area.

Preliminary studies indicated that the construction of 4 miles of collection channels to convey floodwaters primarily from Cat, Dead Indian, and Carrizo Creeks to Palm Valley channel would result in an estimated cost of $10.6 million. Average annual project cost would amount to $700,000; average annual benefits would be $530,000. The benefit/cost ratio would be 0.8. Further studies in this area are warranted.

Indian Wells

Indian Wells, also a resort community, is located just east of Palm Desert. This community is subject to flooding from Deep Canyon. Flood problems along Deep Canyon were studied. The present value of property subject to flood damage is estimated at $132.0 million.

One alternative to reduce the flood problem in Indian Wells would consist of a channel to divert the floodwaters from Deep Canyon to a channel along Cook Road (4 miles of channel). (See pl. 3.) The cost is estimated to be $7.4 million (average annual project cost = $490,000). Another alternative would consist of diverting the floodwaters from Deep Canyon to an existing grass-lined channel. This cost is estimated to be $8.4 million (average annual project cost = $550,000). Average annual benefits would be $400,000 for either of the two alternatives under consideration. The benefit/cost ratio of the first alternative would be 0.8; the benefit/cost ratio of the second would be 0.7. The benefit/cost ratio of each project approaches unity; therefore, further studies along Deep Canyon are warranted.

La Quinta

La Quinta, a residential winter resort with a number of year-round residents, is located on the west side of the Coachella Valley 8 miles southwest of Indio. The area takes its name from the La Quinta subdivision, one of the oldest planned subdivisions in the valley. It is in a sheltered cove surrounded on three sides by the Santa Rosa Mountains. The town is subject to damage by floodwaters, principally from Bear Creek.

Preliminary investigation of the flood problem along Bear Creek in La Quinta indicated that property having a present value of about $30 million is subject to flood damage.

A flood control system to prevent these damages, consisting of reservoirs and 3 miles of channel, was considered. The cost of this flood control plan is estimated at $5.7 million. Average annual project cost would amount to $380,000; average annual benefits would be $330,000. The benefit-cost ratio of such a project appears to be 0.9 or close to unity and, therefore, further studies are warranted.

Oasis Area

The Oasis area is bounded by the Salton Sea on the east, the lower slopes of the Santa Rosa Mountains on the west, Martinez Canyon on the north, and Travertine Rock on the south. It is a highly developed agricultural area devoted mostly to nurseries, citrus, and winter vegetables. The area is subject to flooding from numerous canyons and washes in the Santa Rosa Mountains. Martinez Canyon, Rabbit Canyon, Barton Canyon, and Travertine Palms Wash are the principal contributors of the stormwater flows. The March 1965 report by Bechtel Incorporated prepared for the Coachella Valley County Water District was reviewed with respect to the flood problems in the Oasis area. The present value of property subject to flood damages is estimated at $11.4 million.

The flood control program presented in the Bechtel report would consist of two systems – the northern system would consist of a detention basin, 4 miles of dikes, and 6 miles of evacuation channel; the southern system would consist of about 12 miles of channel. The construction cost was estimated at $30.2 million. Average annual project cost would amount to $2.0 million; average annual benefits would be $300,000. The benefit/cost ratio would be 0.2. Therefore, further studies are not warranted at this time.

RESULTS OF STAGE 1 ITERATION

A summary of the findings resulting from preliminary studies of the areas requested for study by the Riverside County Flood Control and Water Conservation District and the Coachella Valley County Water District, the two sponsoring agencies, is as follows: (1) Further studies in the following areas are not warranted at this time: Smith Creek, Jenson Creek, Stubbe Canyon, Thousand Palms (Edom Area), Rancho Mirage, and Oasis Area; (2) further studies in the following areas are warranted: Palm Desert, Indian Wells, and La Quinta; and (3) further studies are warranted on the main stem of the Whitewater River and Mission Creek.

STAGE 1 RESULTS

These preliminary findings were presented to the sponsoring agencies and to the general public during two public meetings (one at Palm Springs and the other at Palm Desert) on 15 June 1978.

FORMUATION OF ALTERNATIVES

FORMULATION OF ALTERNATIVES

INTRODUCTION

Stage 1 studies included in the reconnaissance report were made primarily to identify areas that should be considered in detail. In Stage 2, formulation of alternatives will be considered to satisfy the planning objectives for those areas identified for further study, the main stem of the Whitewater River, Mission Creek, Palm Desert, Indian Wells, and La Quinta.

IDENTIFICATION OF MEASURES

Measures identified for the areas designated for further study after Stage 1 planning are shown in the following table.

Measures identified for areas designated for further study

Measures	Whitewater River (main stem)	Palm Desert	Indian Wells	La Quinta
Reservoir	x	x	x	x
Earth channel	x	x	x	x
Concrete channel	x	x	x	x
Flood plain management	x	x	x	x
Flood proofing	x	x	x	x
Relocation	x	x	x	x
Levee modification	x	x	x	x
Dip crossings and bridge modification	x	x	x	x
No action	x	x	x	x

From these measures, the alternatives as discussed in the following paragraph entitled "Alternative plans considered" will be developed and considered during Stage 2 planning.

CATEGORIZATION OF APPLICABLE MEASURES

The range of measures was analyzed to establish those that would specifically address the planning objectives. This analysis is presented in the following table.

WHITEWATER RIVER[1]

CATEGORIZED MANAGEMENT MEASURES

Objectives	Reservoir	Earth channel	Concrete channel	Flood plain management	Flood proofing	Relocation
Flood damage reduction	*	*	*	*	*	*
Water supply	*					
Recreation	*	*	*			
Blowsand reduction	*					
Archeological features						*
Fish and wildlife habitat	*					*

[1] Also Palm Desert, Indian Wells, and La Quinta.

ALTERNATIVES CONSIDERED

ALTERNATIVE PLANS CONSIDERED

AREAS IDENTIFIED FOR FURTHER STUDY

The findings of Stage 1 planning resulted in the conclusion that further studies in the following areas were warranted: the main stem of the Whitewater River and Mission Creek; Palm Desert; Indian Wells; and La Quinta.

STRUCTURAL ALTERNATIVES CONSIDERED

The following structural alternatives were considered during Stage 1. Additional alternatives recommended for Stage 2 planning are also presented in the following paragraphs.

Whitewater River – Alternatives considered in Stage 1 were: (1) two dams – one on the San Gorgonio River near Cabazon and the other on the Whitewater River near Whitewater Canyon; (2) a dam on the Whitewater River near Windy Point; (3) a dam on the Whitewater River near Garnet Hill; and (4) channel improvements along the Whitewater River from Point Happy to the Salton Sea.

Additional alternatives to be considered further in Stage 2 planning are: (1) a dam on Mission Creek to reduce the size of dams in the other systems; (2) a channel in the reach from Windy Point to Point Happy.

Palm Desert – The plan considered in Stage 1 included a rectangular concrete channel to convey the floodwater along Palm Valley channel. Subsequent to the completion of the May 1978 information pamphlet, a study was made of a trapezoidal concrete channel. This channel would cost an estimated $9,100,000. Average annual cost would amount to $604,000; average annual benefits would be $530,000. The benefit/cost ratio of such a project, considering only existing development, appears to be 0.9.

Additional alternatives to be considered further in Stage 2 planning are: (1) a reservoir at the mouth of Dead Indian Creek and one at Cat Creek; (2) a diversion system to convey the floodflows from Dead Indian Creek to Deep Canyon; (3) same as alternative 2 above, but divert only a portion of the floodflows from Dead Indian Creek to Deep Canyon and the remaining portion to Cat Creek.

Indian Wells – Alternatives considered in Stage 1 were: (1) a channel diverting the floodwaters from Deep Canyon to a channel along Cook Road; and (2) a channel along Deep Canyon.

Additional alternatives to be considered further in Stage 2 planning are: (1) a grass-lined channel or a rock-revetted channel with cover soil and grass; (2) an earth bottom channel; (3) a reservoir at the mouth of Deep Canyon.

La Quinta – Alternatives considered in Stage 1 included (1) a system of reservoirs at the mouth of Bear Creek, near Calle Chillon, and near Avenida Obregon and a channelization system; and (2) the plan proposed by the Coachella Valley Water Conservation District that consisted of a reservoir near Eisenhower Drive and a channel system that would convey floodflows to the Whitewater River.

Additional alternatives to be considered further in Stage 2 planning are: (1) a system similar to that discussed above, except that the reservoir proposed for the Bear Creek site would be located at an upstream site in an attempt to minimize construction cost; and (2) a channel from the mouth of Bear Creek to the Whitewater River.

NONSTRUCTURAL ALTERNATIVES CONSIDERED

Nonstructural measures such as regulation of the flood plain, floodproofing, relocation, flood insurance, flood warning and evacuation, and modification of existing structures will be considered for the areas identified for further study. Nonstructural alternatives will be considered throughout the planning stage and at least one nonstructural alternative will be identified in the final stage of the survey report. These and other measures are discussed below.

Whitewater River

Flood zoning and building codes – A significant amount of acreage adjacent to the Whitewater River is undeveloped or in agriculture. This land is subject to residential and commercial development. The Corps should define the flooding characteristics and suggest development controls that might be implemented by local governments.

Flood proofing existing structures – Floodproofing existing structures might be feasible. The Corps will investigate methods such as the construction of perimeter berms or floodwalls for either individual buildings or groups of buildings. Modifications to doors, windows, or the outer covering of structures might have merit. The Corps will compare the cost of floodproofing to the risk of flood damage to determine the economic merit and the feasible extent of floodproofing.

Levee modifications – The local community might elect to strengthen the levees to achieve a higher degree of flood protection. Rock lining to a height of several feet above the adjacent ground level might be effective in reducing levee erosion and increasing channel capacity. The Corps will evaluate the levees and identify the effects of several typical modifications. The Corps will also compare the cost of these modifications to the benefits of reducing flood damage.

Flood insurance – Recently completed and ongoing flood insurance studies will identify most of the Whitewater River flood plain. The Corps will stress the availability of flood insurance in its reports.

Flood warning – Because the Whitewater River watershed is large, sufficient lead time may be available to provide a functional flood warning system. The U.S. Army Corps of Engineers will make quantitative estimates of lead time and develop a framework for a warning system that could be implemented by local governments. The warning system should include meteorologic-hydrologic monitoring of the watershed, a good communication system, a central responsible agency, an emergency work plan, an evacuation plan, and a relief plan. The Corps should identify key locations along the river such as unstable levees, obstructive bridges, or confluence locations that should be monitored and maintained during floods.

Dip crossing and bridge modifications – At several locations, levees have been lowered to accommodate road profiles for dip crossings. The Corps will review these dip crossings and compare the cost of corrective action to the flood damages resultant from these lowered levees. Potential improvements

would include filling the levees and rerouting traffic, changing the road profile, or bridging the river. Dip crossings at Avenues 44, 50, 52, and 54 in the vicinity of Indio and Ramon Avenue and Indian Avenue in the vicinity of Palm Springs should be studied. The Highway 60 (Dillion Road) bridge has numerous piers and its abutments encroach into the channel. The obstructive effects to this bridge and corrective action will also be studied.

Combination plan – Because the study reach along the Whitewater River is over 50 miles long, it is likely that the application of different alternatives for parts of the reach would result in the most beneficial combination of flood damage reduction measures. Local officials will need to provide input for determining the best combination plan.

No action – A decision of "no action" will do nothing to alleviate the existing flood hazard or other problems and needs in the study area. The "no action" plan will, however, serve as a base condition against which other plans can be compared. The base condition will reflect flood plain management controls as developed by the flood insurance studies currently being conducted.

Palm Desert, Indian Wells, La Quinta

Because the communities of Palm Desert, Indian Wells, and La Quinta have developments in similar physiographical areas, the discussion of nonstructural alternatives is pertinent to all three areas.

Flood zoning and building codes – About 4 square miles lie undeveloped in the Palm Desert area. Based on the ferocity of the 1976 flood, much of this land is subject to high velocity, debris laden erosive flows. Local zoning control of this land, commensurate with the flood hazard, may be desirable. The Corps will evaluate the flooding characteristics of this land and consider recommendations for suitable development controls. An extreme recommendation could be to permit no development in some areas until structural improvements are made. Regulations controlling first floor elevations, foundation design, site grading, and landfill might be feasible and useful. Floodproofing new structures falls under this category.

Floodproofing existing structures – Floodproofing may be highly effective for existing structures located in lower parts of the debris cones. For those structures in the upper debris cones and adjacent to inadequate channels and levees, floodproofing may offer some relief to frequent flooding. However, floodproofing may not stand up against major

floods. The Corps should study flood characteristics and existing structures to determine suitable methods of floodproofing. The Corps should also compare the cost of floodproofing to the financial risk of flood damage to determine the economic feasibility of floodproofing. Floodproofing such as providing foundations for mobile homes, perimeter walls, and modifications to window and door openings might prove to have merit.

Relocation – It may be desirable to relocate mobile homes and other structures in especially hazardous locations. The Corps should study flooding characteristics to identify hazardous areas and make recommendations on relocation. The Corps should evaluate the cost of relocation versus the financial risk of flood damage to determine the economic feasibility of relocation. The Corps should also identify the risk of injury or loss of life to those people residing in these hazardous areas.

Levee modifications – In the event that a Federal project is not justified, the local community may elect to strengthen the existing levees and dikes. A review of the capability of the existing structures by the Corps would be of value. The Corps should then determine the structural requirements and costs to achieve various degrees of flood protection (from say 10-, 25-, 50-, and 100-year events). The Corps should also estimate the benefits derived from such structural modifications. Structural improvements, such as rock lining of the diversion dikes at the mouth of Magnesia Creek or of the levees on Deep Canyon might have merit. The Corps may also identify certain high levees as unstable and recommend that they be removed or lowered to prevent catastrophic sudden failure.

Flood insurance – Flood insurance studies for the concerned communities are currently being conducted by consulting engineers for the Federal Insurance Administration. The Corps needs to do no work on flood insurance studies, but should alert the communities to the identified flood hazard and to flood insurance as a means of reducing the burden of catastrophic financial losses. Flood insurance may also be an important interim solution if projects are proposed, but could not be constructed for several years.

Flood warning – Because of the rapid and somewhat unpredictable nature of flooding in the Palm Desert, Indian Wells, and La Quinta areas, a flood warning system would probably not provide timely warning to result in a significant reduction of property damages. However, such a system might provide intangible benefits such as a reduction in the number of injuries and lives lost. The Corps should apply its expertise in the fields of meteorology, hydrology, and hydraulics to define the basic framework of a warning system that might be implemented by local government. The flood warning system being developed for the Phoenix Urban study area is a good example of what can be done. An active local flood warning system might also be instrumental in producing community awareness of the flood hazard.

Combination plan – A combination plan using the previously mentioned items may be the best nonstructural alternative for reduction of flood damages. It appears that each item would have particular merits for different parts of the area. Input from the local governments and the public will be required to prepare the most usable plan.

No action – A decision of "no action" will do nothing to alleviate the existing flood hazard or other problems and needs in the study area. The "no action" plan will, however, serve as a base condition with which other plans can be compared.

IMPACT ASSESSMENT

INTRODUCTION

IMPACT ASSESSMENT

The purpose of an impact assessment is to determine the type and amount of change expected from implementation of alternative plans as compared to impacts under "without" conditions. The task of impact assessment requires identifying all significant economic, social, environmental, and institutional changes associated with each alternative plan. Some of the major steps in impact assessment to be considered in Stage 1 planning are to determine sources of impacts and to identify and to trace impacts.

DETERMINE SOURCE OF IMPACTS

The sources of impacts associated with the alternative must be identified in terms of type, location, and extent. This analysis has been made for alternatives considered in Stage 1 planning. The results of that analysis pertaining to areas that will be considered in Stage 2 planning are presented in the following paragraphs.

WHITEWATER RIVER – IMPACTS

Sources of Impacts

San Gorgonio Dam: Construction of a flood control structure east of Cabazon will not affect any proposed or existing wildlife sanctuaries or refuges, nor will it have a direct effect on any federally listed rare or endangered plant or animal species. The dam will impact two prehistoric trails and two large, prehistoric archeological sites.

Whitewater Canyon Dam: Construction of a flood control structure at Red Dome will have an effect on a proposed wilderness area on the northwest side of the Morongo Valley. The Whitewater wildlife sanctuary and trout farms located downstream from the proposed dam may also be adversely affected. The proximity of the reservoir to the Bighorn lambing grounds and migratory deer water range will require careful wildlife planning and coordination with the USF&WS. No rare or endangered plant species are known to exist in the area near the proposed dam, nor are any archeological sites believed to be present. Detailed surveys will be required to assure that no sites will be adversely affected.

Windy Point Dam: Construction of a flood control structure at the confluence of the San Gorgonio and Whitewater Rivers could have a minor adverse effect on the winter range of the Bighorn Sheep. However, any increase in the supply of water would be beneficial to most animal species in the area. The project's location immediately downstream from the Whitewater wildlife sanctuary could be viewed as an environmental

benefit. No rare or endangered plant species have been identified near the proposed dam. One prehistoric archeological site could be adversely affected by the dam; however, other undiscovered sites are probably present.

Garnet Dam: A flood control structure southeast of Garnet Hill would not adversely affect any wildlife refuge or sanctuaries, nor, probably, would it affect any rare or endangered plant or animal species. No archeological sites have been recorded in the area; however, a survey of the affected area may identify many undiscovered sites. There is a major blowsand problem in the area. Detailed studies of the cause of the blowsand problem and the effect of a dam are needed in order to determine if the proposed structure would improve, worsen, or have no effect on the blowsand problem.

Sand dunes as habitat: A reduction in blowsand may have a long-term effect on species dependent upon sand dunes as habitat. These effects require study.

Whitewater River channel and levee: A system of channels and levees along the Whitewater River may adversely affect the marsh area at the upstream (northwest) end of the Salton Sea. With this exception, the project would not affect any known rare or endangered plant or animal species. The northwesternmost portion of the project might affect the blowsand problem. Archeological sites, if any, near the existing levee improvements may be affected by the project.

Mission Creek: A flood control structure on Mission Creek would adversely affect the proposed Morongo Hills wilderness area and

may contribute to the serious blowsand problem. The area immediately adjacent to the creek may contain numerous archeological sites. No rare or endangered plant or animal species are known to occupy the area.

Flood control structures on Cat Creek, Dead Indian Creek, Carrizo Creek, Deep Canyon, and La Quinta Canyon Creek would have an adverse effect on the summer and winter ranges of the Bighorn Sheep, as well as adversely affecting several other rare and endangered plant and animal species. Archeological surveys of the above project areas identified 66 archeological sites.

IDENTIFICATION AND TRACING OF IMPACTS

The purpose of this activity is to identify and trace the impacts associated with each alternative plan. Because the principal purpose of Stage 1 planning is problem identification, the identification and tracing of impacts at this stage of the planning process have been minimal. The impacts associated with the alternatives discussed in Stage 1 planning are also included in the Whitewater River impact paragraphs above.

EVALUATION

INTRODUCTION

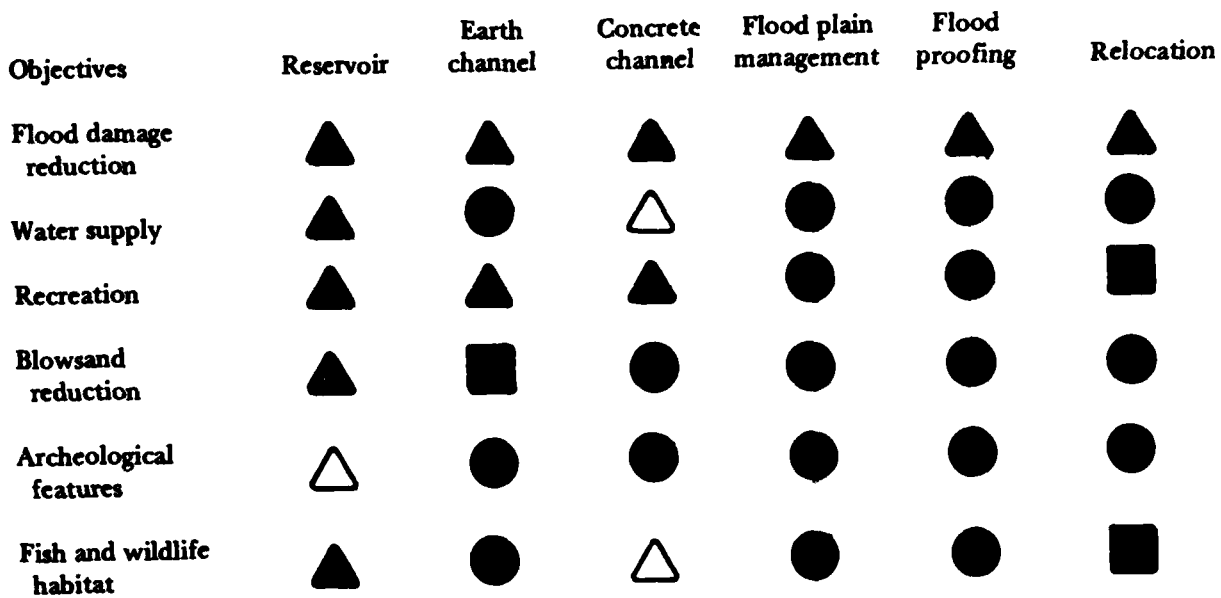
EVALUATION & CRITERIA

Evaluation is the process of analyzing plans against the "without" conditions and against each other to determine and compare their beneficial and adverse contributions for the purpose of selecting a plan. Because Stage 1 planning does not propose to select a plan, only a preliminary analysis was performed – that is, an appraisal of planning objective fulfillment, a display of system of accounts, and the evaluation criteria analysis. During Stage 2 and particularly in Stage 3, a detailed impact assessment and evaluation analysis will be performed. At this moment, the procedure proposed in an OCE manual, "Water resources assessment methodology (WRAM) – Impact assessment and alternative evaluation," can be used to determine the impacts and evaluate the alternatives.

APPRAISAL OF PLANNING OBJECTIVE FULFILLMENT

The purpose of this task is to determine the relationship of the impacts of alternative plans to the planning objectives. Because the appraisal of objective fulfillment involves comparing the significant impacts for each alternative, a cursory evaluation could only be performed at this planning stage. The result of this evaluation is presented in the following tables.

PLANNING OBJECTIVE FULFILLMENT*
WHITEWATER RIVER



*Preliminary subjective analysis.

PLANNING OBJECTIVE FULFILLMENT* – (Cont'd)
PALM DESERT-INDIAN WELLS-LA QUINTA

Objectives	Reservoir	Earth channel	Concrete channel	Flood plain management	Flood proofing	Relocation
Flood damage reduction	▲	▲	▲	▲	▲	▲
Water supply	▲	●	△	●	●	●
Recreation	▲	▲	▲	●	●	■
Blowsand reduction	●	●	●	●	●	●
Archeological features	△	■	■	●	●	●
Fish and wildlife habitat	▲	●	△	●	●	■

▲ = Positive

△ = Negative

● = Neutral

■ = Undetermined

*Preliminary subjective analysis.

SYSTEM OF ACCOUNTS

The associated impacts (economic, regional, environmental, and social well-being) for the alternatives considered in the Stage 1 reconnaissance study are presented in this section. During Stage 2 planning, a system of accounts will be generated for all alternatives, both structural and nonstructural, for purposes of comparison and to facilitate selection of a plan. The system of accounts presented at the end of the Stage 2 planning process will be more specific in nature than that in this reconnaissance stage. The associated impacts are shown on plate 4.

EVALUATION CRITERIA

This activity involves applying specified criteria to the alternative plans to test their responsiveness. These criteria are: Acceptability (public expression concerning the various impacts and the degree to which the alternatives achieve the planning objectives); certainty (likelihood of achieving the planning objectives should the plan be implemented); completeness (inclusion and incorporation of all necessary actions and investments required to assure full attainment of the plan and its objectives); effectiveness (technical performance and contribution to the planning objectives); efficiency (ability to achieve planning objectives in the least costly manner); National Economic Development (NED) benefit/cost ratio (ratio of net tangible benefits to tangible economic costs); geographic scope (pertinence of the geographic area encompassed by an alternative to the services and outputs of the plan); reversibility (degree to which a given alternative, once partially or fully implemented, could be reversed and impacted areas restored to approximate base condition); and stability (the range of "alternative futures" that can be meaningfully addressed within the scope of the alternative, or with minor modifications). The response to the evaluation criteria is shown in the following table.

RESPONSE TO EVALUATION CRITERIA*
WHITEWATER RIVER

		Earth channel		Concrete channel				
Criteria	Reservoir	Whitewater River	Tributaries	Whitewater River	Tributaries	Flood plain management	Flood proofing	Relocation
Acceptability	+	+	+	-	-	-	-	-
Certainty	+	+	+	+	+	-	-	+
Completeness	+	+	+	+	+	-	-	+
Effectiveness	+	+	+	+	+	-	-	+
Efficiency	+	+	+	+	+	-	-	-
Geographic scope	+	+	+	+	+	+	+	+
NED B/C ratio	+	-	+	-	+	-	-	-
Reversibility	-	+	+	-	-	+	+	+
Stability	+	+	+	+	+	-	-	-

Positive = +

Negative = -

Unknown = 0

*Preliminary subjective analysis.

THE COMPLETE STUDY

THE COMPLETE STUDY

INTRODUCTION

The study will follow the planning process previously described, that is, three-stage planning. The first stage, the reconnaissance study, has been accomplished by this report. Development of the remainder of the study and the associated costs has been scheduled for Stage 2 (Development of Intermediate Plans), and Stage 3 (Development of Detailed Plans). A public involvement program for the Whitewater River Basin has been initiated to insure continuous public involvement in the planning process.

FUTURE STUDIES

Engineering Studies

Hydrologic studies (Account .41) – Hydrologic studies will cost $62,500 and will include:

(1) Determining the meteorological and flood runoff characteristics for the main stem of the Whitewater River, Mission Creek, and other tributaries in the vicinity subbasins of Palm Desert, Indian Wells, and La Quinta.

(2) Determining peak discharge and volume frequencies, flood and sediment production for the above areas, plus a determination of the standard project and probable maximum floods. Effort will include routings of floods under existing conditions and under various alternatives.

(3) Determination of residual flows, with various alternatives.

Hydraulic studies (Account .42) will cost $107,900. They will include analysis of existing channel capacities, delineation of overflow areas, and sediment transport studies. They will also include design of channels, reservoirs, and debris basins for the following areas.

Hydraulic studies will also include design for structural and nonstructural alternatives.

	Without proj. ch capacity	Without proj. overflows	With project ch design	Debris basins, reservoirs
Whitewater main stem	50 mi	50 mi	50 mi	4 reservoirs
Palm Desert	5 mi	4 mi	4 mi	1 debris basin
Indian Wells	5 mi	5 mi	4 mi	—
La Quinta	2 mi	21 mi	3 mi	3 reservoirs
Mission Creek	5 mi	5 mi	2 mi	1 reservoir

Design studies and cost estimates (Account .11) will total $113,100. They will include a determination of quantities and cost estimates for every structural feature listed above. Design and cost estimates will be required to determine separable costs of all project features. Studies will include delineation of required rights-of-way. Design studies and cost estimates will also be required for nonstructural alternatives.

Survey and mapping (Account .08) – This activity will include limited surveys as necessary to develop data for reservoir design. Surveys will cost $9,000.

Materials and foundations investigations (Account .10) – The studies anticipated are those needed to determine general project feasibility. They will cost $108,900 and will include:

(1) Examination and evaluation of available soils and borings information.

(2) Exploratory test borings at feasible reservoir and debris basin sites.

(3) Determination of foundation conditions, sources of construction materials, earth slopes, and ground-water levels of each site under study.

(4) Preliminary evaluation of seismicity – The general susceptibility to earthquake damage.

Socio-economic studies (Account .07)

Socio-economic studies will cost $121,200. For the investigation, socio-economic studies that are required to comply with present regulations and to determine the feasibility of providing increased flood protection in the Whitewater River Basin will include the following:

(1) Inventorying economic and social settings, including existing land use, population, employment, industry, utilities and services, and taxes.

(2) Determining existing and estimated future land uses.

(3) Evaluating existing and projected property values of lands subject to flooding.

(4) Analyzing alternative futures with and without a project.

(5) Determining expected damages that would occur from future floods over the life of the project.

(6) Performing a socio-economic evaluation and effect assessment of alternative plans.

(7) Assisting in identification of a National Economic Development (NED) plan from alternatives considered.

(8) Computing annual charges from first costs and future costs for alternative plans.

(9) Estimating annual benefits accruing to alternative plans. Anticipated benefits include flood damage reduction, savings in cost of fill, location benefits, employment benefits, recreation benefits, water conservation, and reduction in blowsand damages.

(10) Computing benefit/cost ratios for alternative plans.

Environmental studies (Account .05)

Environmental studies will cost $64,700. These studies will be performed in compliance with the National Environmental Policy Act of 1969 and will include the following:

(1) Preparing an environmental inventory including cultural resources to reflect current conditions in the study area.

(2) Preparing an environmental assessment of the impact of alternative plans.

(3) Delineating any adverse environmental effects of alternatives that could be avoided; determining the relationship between local short-term uses and the maintenance and enhancement of long-term productivity; and identifying any irreversible and irretrievable commitments of resources.

(4) Assisting in the identification of an Environmental Quality (EQ) plan from alternatives considered.

(5) Performing a tradeoff analysis for preservation and enhancement of environmental quality.

(6) Preparing and coordinating an environmental working paper and draft and final environmental impact statements.

(7) An archeological overview was prepared for the Stage 1 study, but more specific site studies will be initiated as alternative plans are formulated in subsequent studies.

Recreation studies (Account .26)

Recreation studies required to assess the feasibility of providing increased public recreational opportunities in the Whitewater River Basin will cost $36,000 and will involve the following:

(1) Evaluating characteristics of the recreation market area, including present population and population trends.

(2) Determining present and probable future recreational facilities and recreational use in the study area.

(3) Recreational studies will include preliminary design of recreational facilities for those feasible alternatives that can accommodate recreational development. Analysis of recreational benefits will also be a part of these studies.

(4) Selecting a recreation plan that is consistent with current policy, is economically feasible, and that meets the desires of local interests.

(5) Project enhancement.

Real estate (Account .12) – Real estate studies will total $27,000. Costs of rights-of-way, easements, and severance damages for various alternatives will be determined. The value of land with and without flood protection will be determined for evaluation of location benefits.

Fish and wildlife studies (Account .06) – The U.S. Fish and Wildlife Service will be requested to provide the data necessary to determine impacts on fish and wildlife resources in the study area. These studies are estimated to cost $9,900.

Nonstructural evaluations (Account .43) – These evaluations are estimated to cost $52,200. They will include evaluation of flood plain regulation, floodproofing, relocation of property, flood insurance, flood warning systems, evacuation, modification of levees, such as rock lining of diversion dikes, and bridge modification. In addition, combinations of structural and nonstructural measures will be evaluated.

Study manangement (Account .13) – The total cost for this account category is $415,300. Costs are allocated in the following manner:

Project management – The management of all study activities includes scheduling, budgeting, work activity scoping, assignment, coordination, and review so that manpower money and time are used in an efficient manner. Reporting on study progress and briefing of higher authority is a part of this cost.

Coordination and public involvement – This includes coordinating study activity with other interested citizens, groups, and agencies. Preparing for and followup on public meetings, workshop meetings, and study presentations to interested groups is a part of this cost. Answering inquiries from the public is also part of this cost.

Impact evaluation – This will require evaluating all significant economic, social, environmental, and institutional changes associated with each alternative plan. It includes evaluating the NED and EQ alternative plans for each site.

Preparation of reports – This includes the preparation of text, tables, plates, graphics, typing, and reproduction of study documents such as the reconnaissance report, Stage 2 documentation, the draft survey report, and the final survey report.

Special study

Blowsand study (Account .20) – This study will cost $99,900. It will include evaluating existing soil and geologic data, determining sources of windblown material, identifying methods of control, and determining associated costs for alternatives to alleviate the blowsand problem. Studies to determine the interrelationship between floods and the blowsand condition will be conducted. Sediment transport studies, development of a rational economic analysis, and other studies as required will be developed in cooperation with the Coachella Valley Association of Governments, CalTrans, and others as needed.

PUBLIC PARTICIPATION

In order to provide continuous public involvement, the Whitewater River Basin study will utilize a citizen's advisory committee, informal workshops, public brochures, and informal meetings with interest groups. The citizen's advisory

committee will consist of local citizens and others interested in the study. This committee will participate in a series of informal workshops in the development of alternative plans to solve water resources problems in the Whitewater River Basin. Involvement of a diverse group with varied concerns – such as representatives of the local flood control districts, environmental groups, homeowners, and business leaders, those most directly affected by alternative plans – will assure balanced, ongoing, public input to the study. The composition of the advisory committee could change as the study progresses and specific problems are identified.

Information pamphlets and informal handouts will be used at workshop and public meetings. Information will include problem identification, alternative plans developed, and discussion of impact assessment for alternative plans.

TOTAL COST

The estimated total cost of this survey report study is $1,450,000. The cost allocations are displayed on the "Study Cost Estimate (PB-6)." (See pl. 4.)

SCHEDULING

WORK SCHEDULE

The work schedule and studies required are shown in the study flow diagram. (See pl. 5.)

MILESTONE SCHEDULE

The milestone schedule is shown below.

No.	Table	Proposed date
2	Approval of reconnaissance report	Aug. 1978
3	Submittal of Stage 2 documentation to Division	Mar. 1980
4	Stage 2 checkpoint conference	Apr. 1980
5	Completion of action on MFR	June 1980
5A	Intermediate public meeting	July 1980
6	Submit draft survey report and draft environmental impact statement	Sept. 1980
7	Stage 3 checkpoint conference	Nov. 1980
8	Complete action MFR	Dec. 1980
9	Coordination of draft survey report and draft environmental impact statement	Mar. 1981
9A	Late stage public meeting	May 1981
10	Submittal of final survey report and revised draft environmental impact statement to Division	Aug. 1981
11	Release of Division Engineer's public notice and submittal of report to BERH	Sept. 1981

SUMMARY

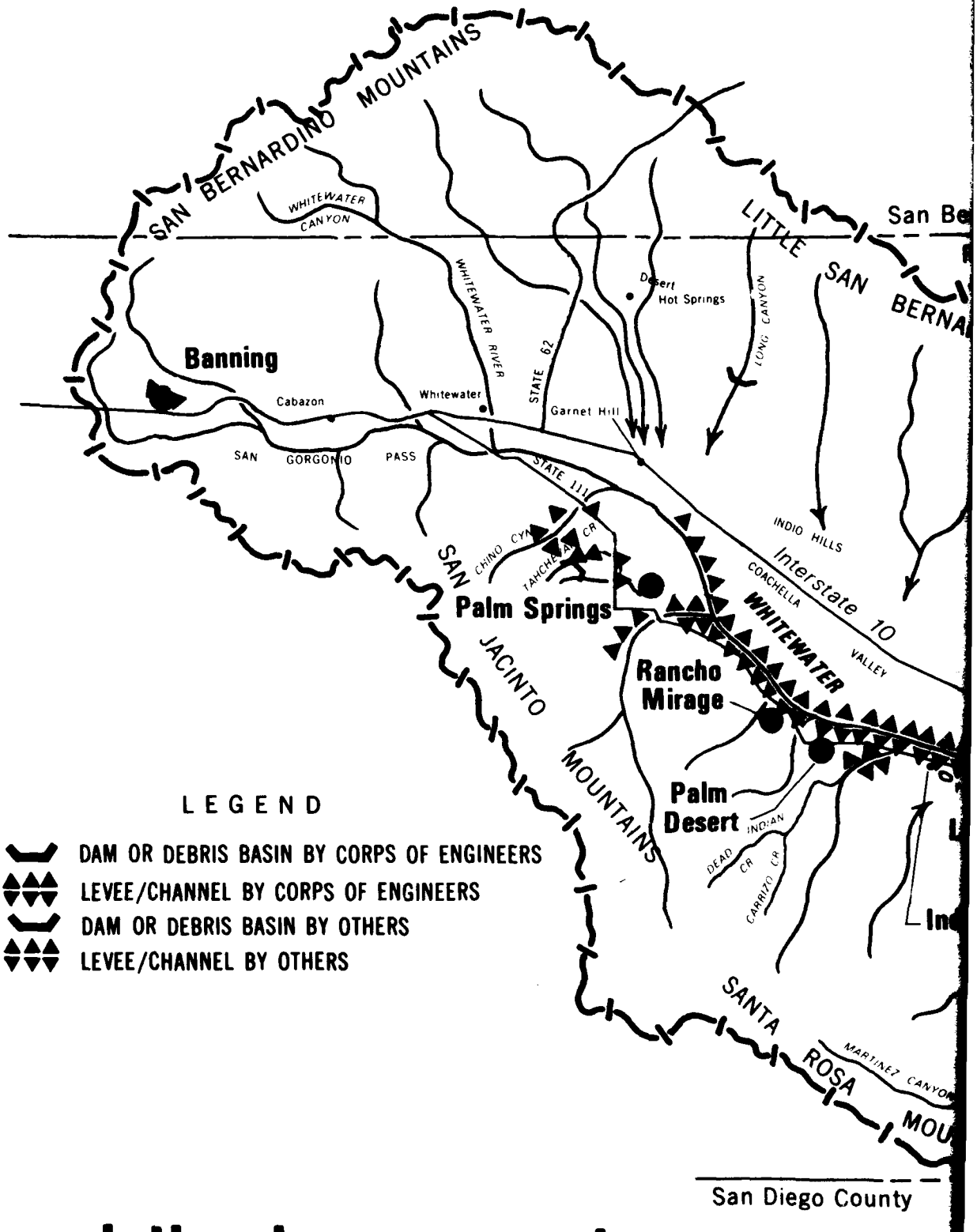
This study encompasses the entire reach of the Whitewater River, together with its tributaries. Flood problems in the Whitewater River Basin have been a major concern of local residents for many years. Significant floods in 1965, 1966, 1969, and 1976 caused substantial damage to urban and agricultural areas throughout the basin.

The Riverside County Flood Control and Water Conservation District and the Coachella Valley County Water District, the two sponsoring agencies, have requested that certain areas and problems be studied. Preliminary studies were made of these areas. These findings resulted: (1) Further studies in the following areas are not warranted at this time: Smith Creek, Jenson Creek, Stubbe Canyon, Thousand Palms (Edom Area), Rancho Mirage, and Oasis Area; (2) further studies in the following areas are warranted: Palm Desert, Indian Wells, and La Quinta; and (3) further studies are warranted on the main stem and Mission Creek. In addition, further study of the blowsand problem is also recommended.

SUMMARY

RECOMMENDATION

It is recommended that this reconnaissance report be approved as a guide for completing the proposed survey report.



existing improvements

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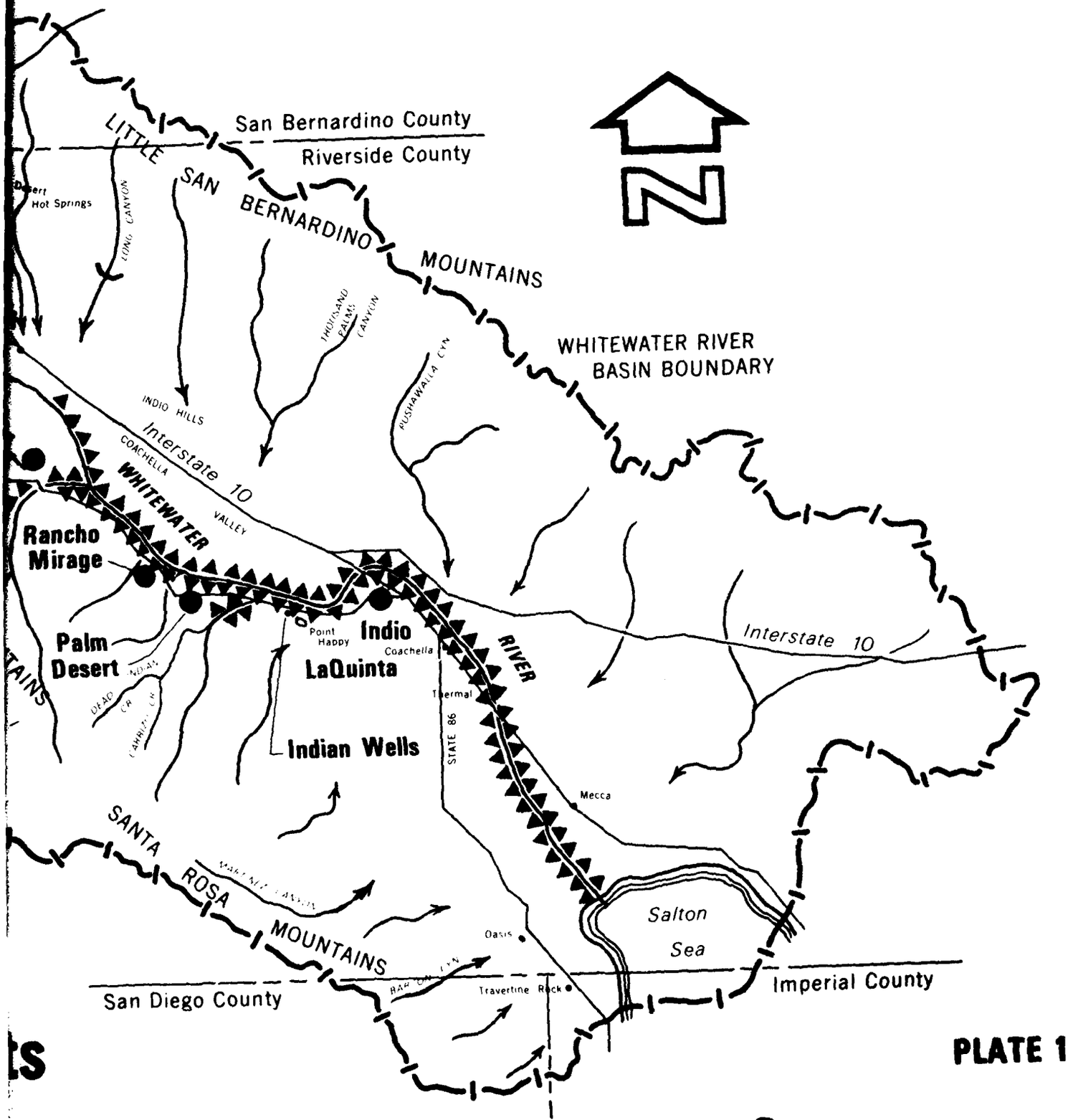
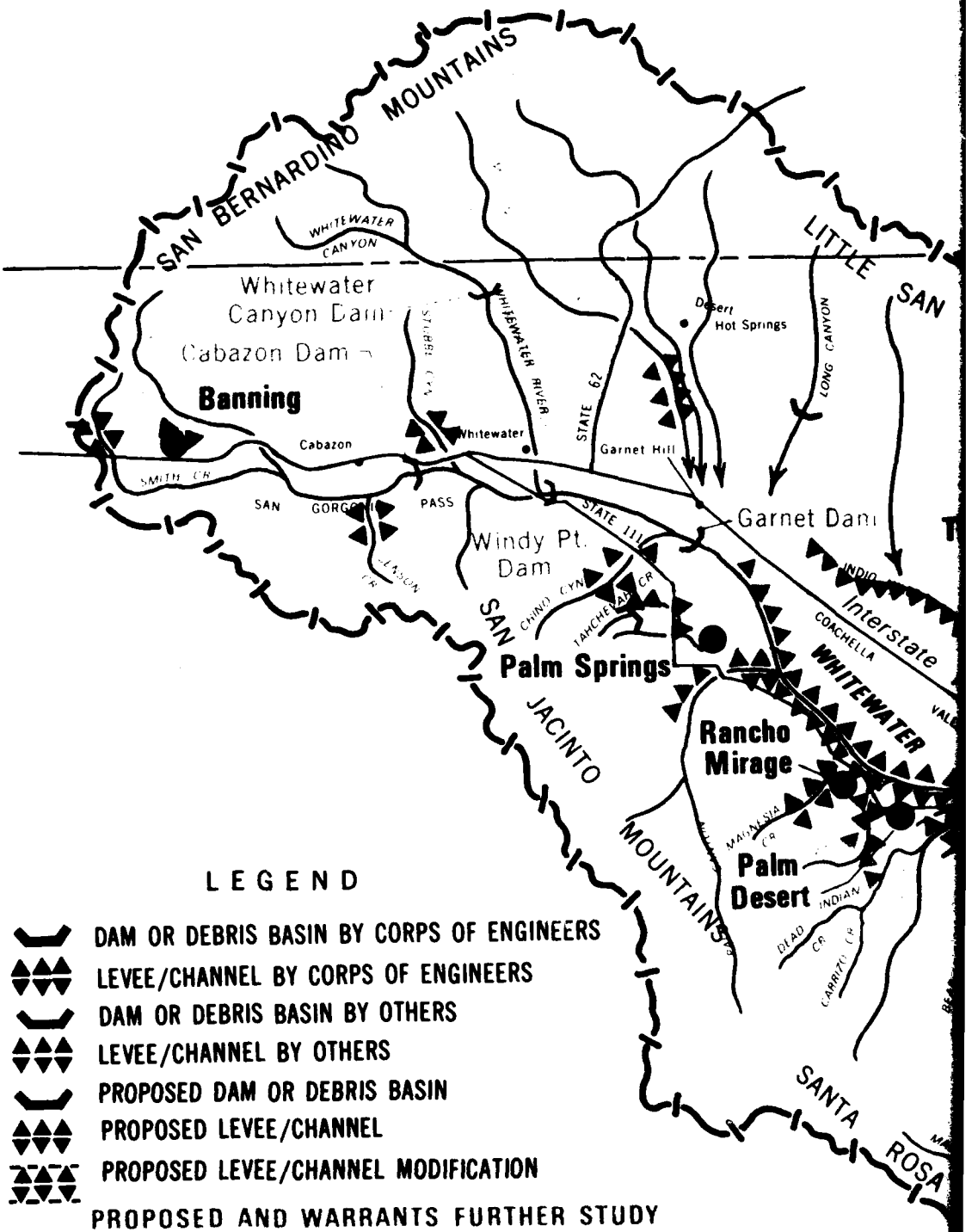

San Bernardino County
Riverside County
LITTLE SAN BERNARDINO MOUNTAINS
WHITEWATER RIVER BASIN BOUNDARY
Desert Hot Springs
LONG CANYON
THOUSAND PALMS CANYON
PUSHAWALLA CYN
INDIO HILLS
COACHELLA VALLEY
Interstate 10
WHITEWATER
Rancho Mirage
Palm Desert
Point Happy
Indio
Coachella
LaQuinta
Thermal
Indian Wells
STATE 86
RIVER
Interstate 10
Mecca
SANTA ROSA MOUNTAINS
Oasis
Salton Sea
Travertine Rock
San Diego County
Imperial County

PLATE 1



area of investigation and improvements considered

San Diego C

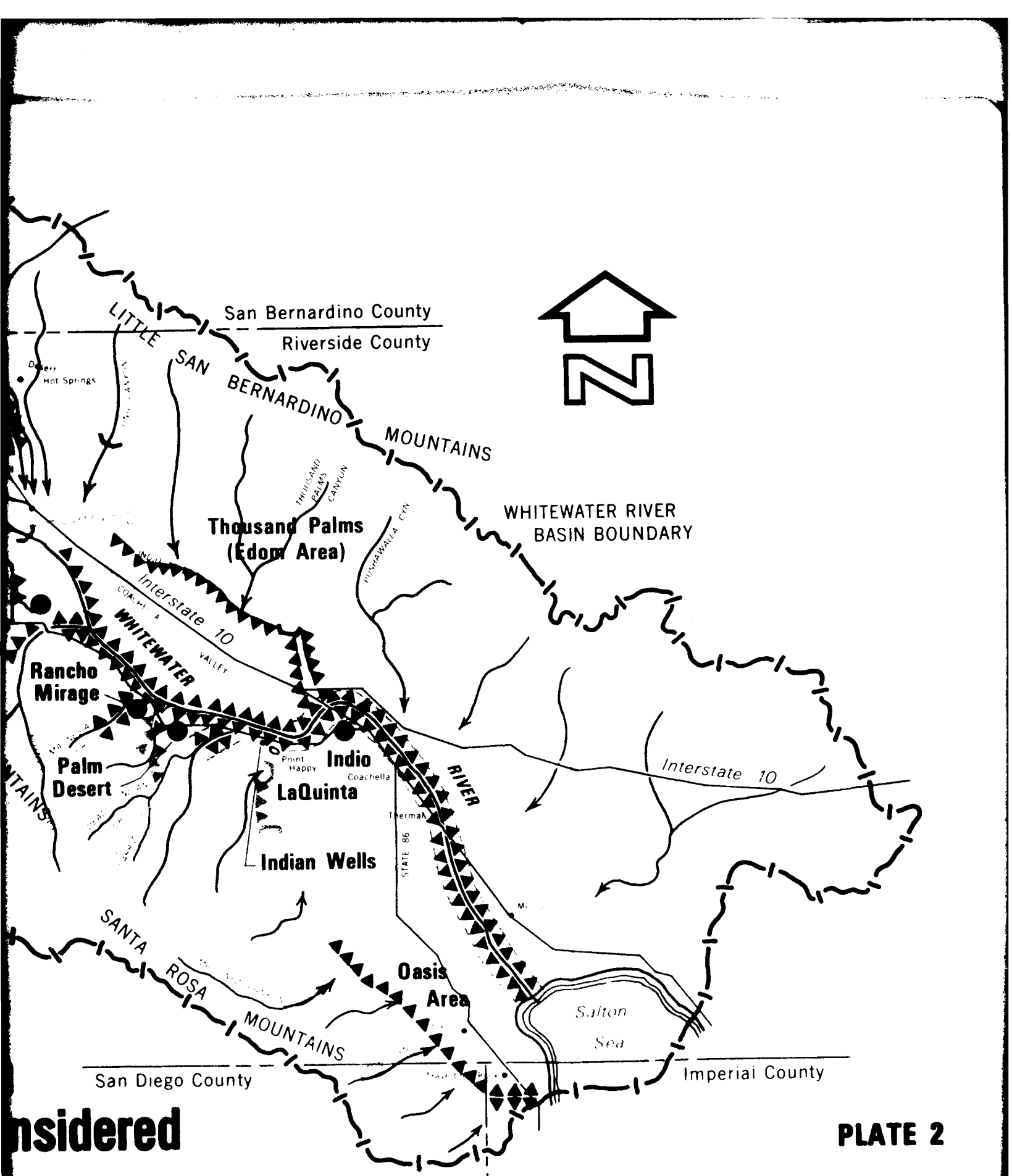


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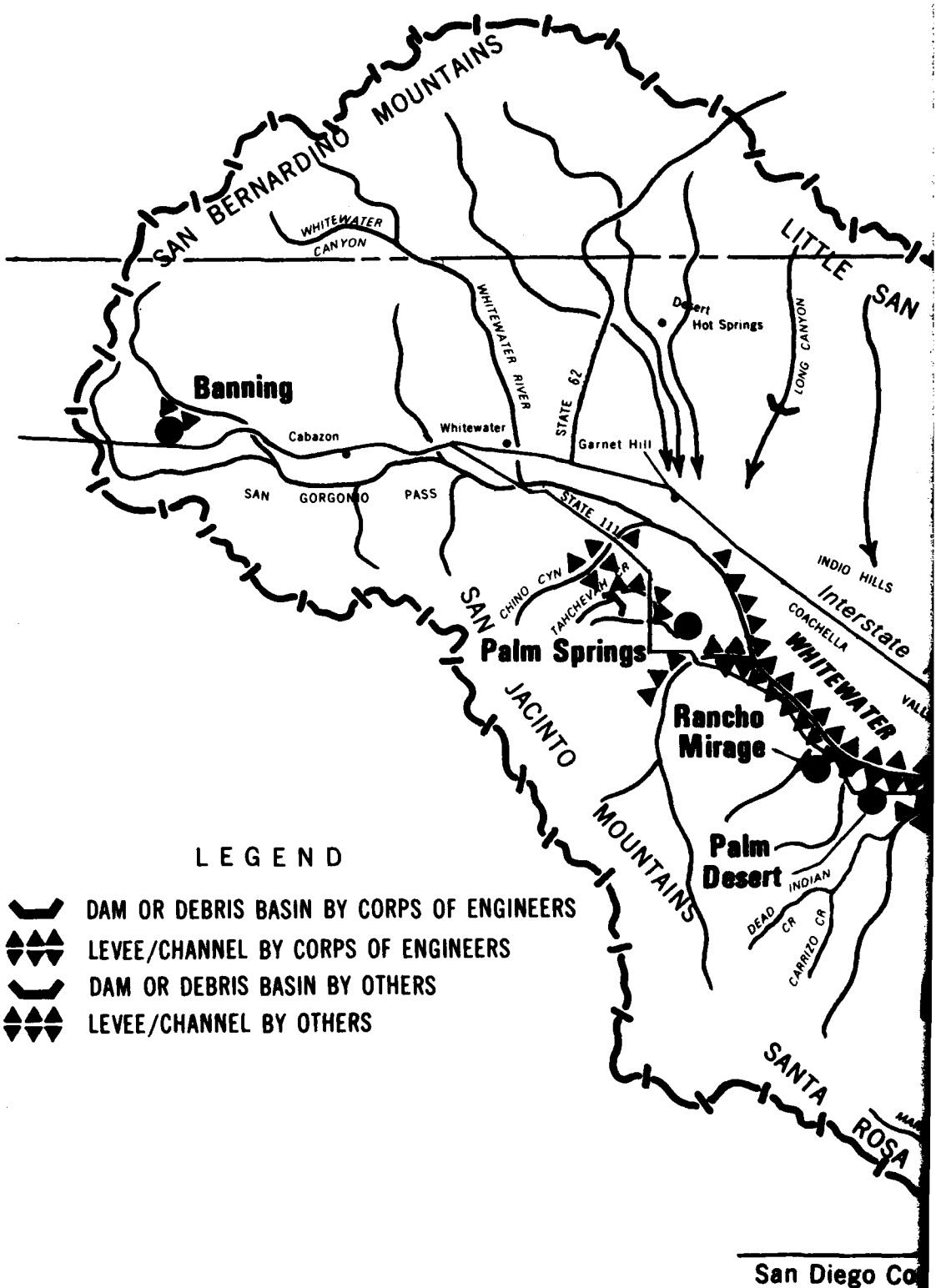
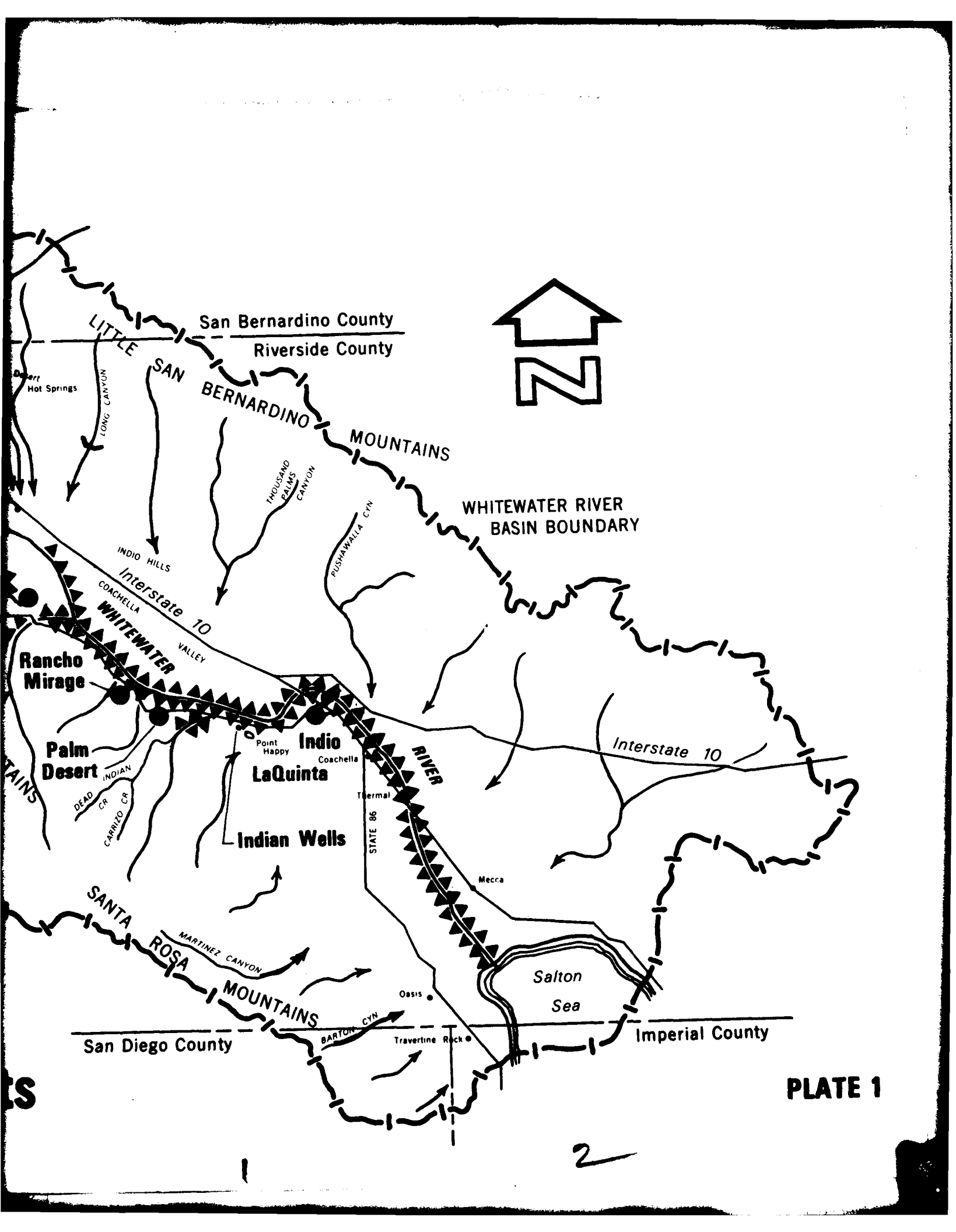
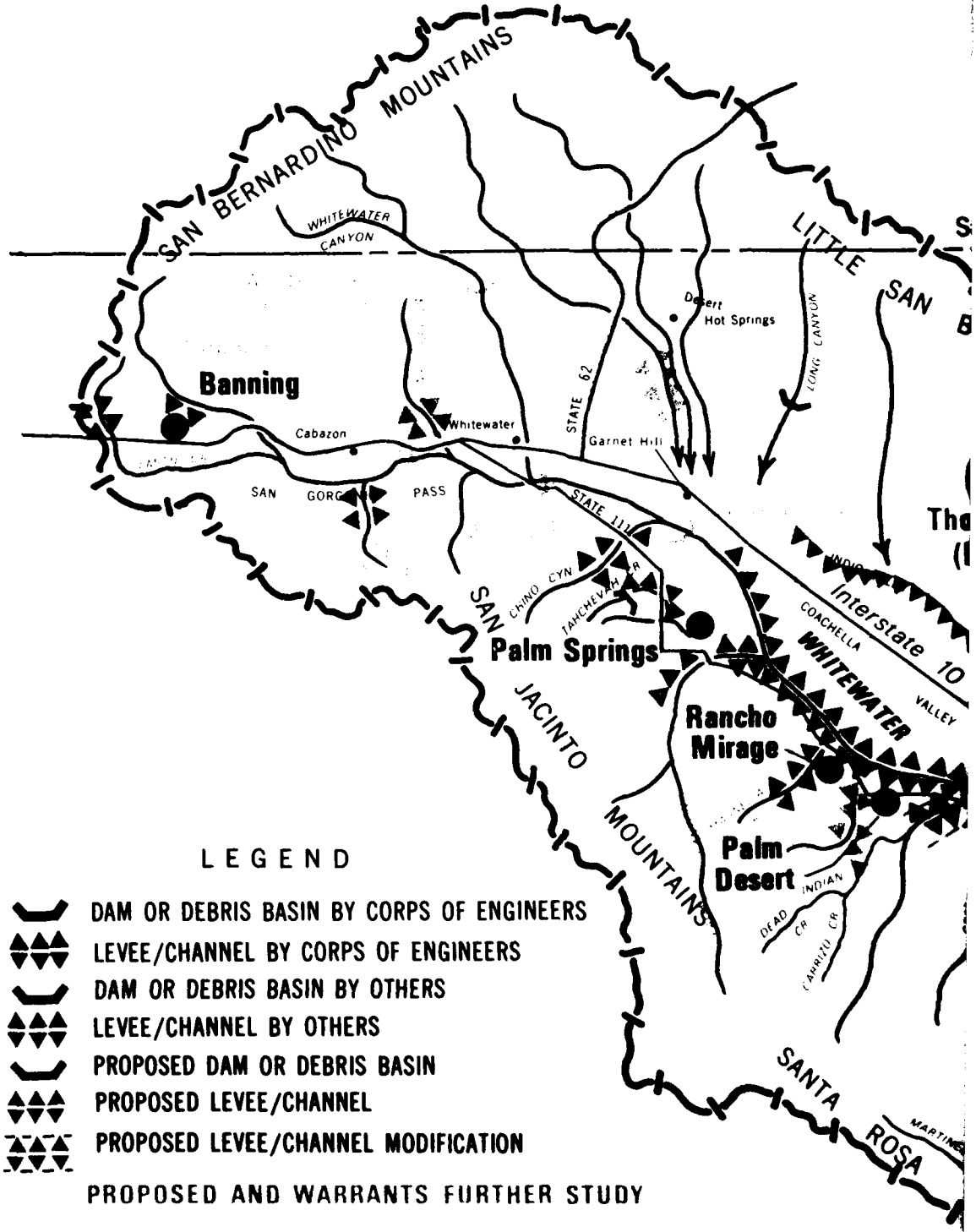
PLATE 2

2



existing improvements


San Bernardino County
Riverside County
LITTLE SAN BERNARDINO MOUNTAINS
Desert Hot Springs
LONG CANYON
THOUSAND PALMS CANYON
PUSHAWALLA CYN
WHITEWATER RIVER BASIN BOUNDARY
INDIO HILLS
COACHELLA VALLEY
Interstate 10
WHITEWATER
Rancho Mirage
Palm Desert
INDIAN CR
DEAD CR
CARRIZO CR
Point Happy
Indio
Coachella
LaQuinta
Indian Wells
Thermal
STATE 86
RIVER
Interstate 10
Mecca
SANTA ROSA MOUNTAINS
MARTINEZ CANYON
Oasis
BARTON CYN
Travertine Rock
Salton Sea
San Diego County
Imperial County
PLATE 1



area of investigation and improvements considered

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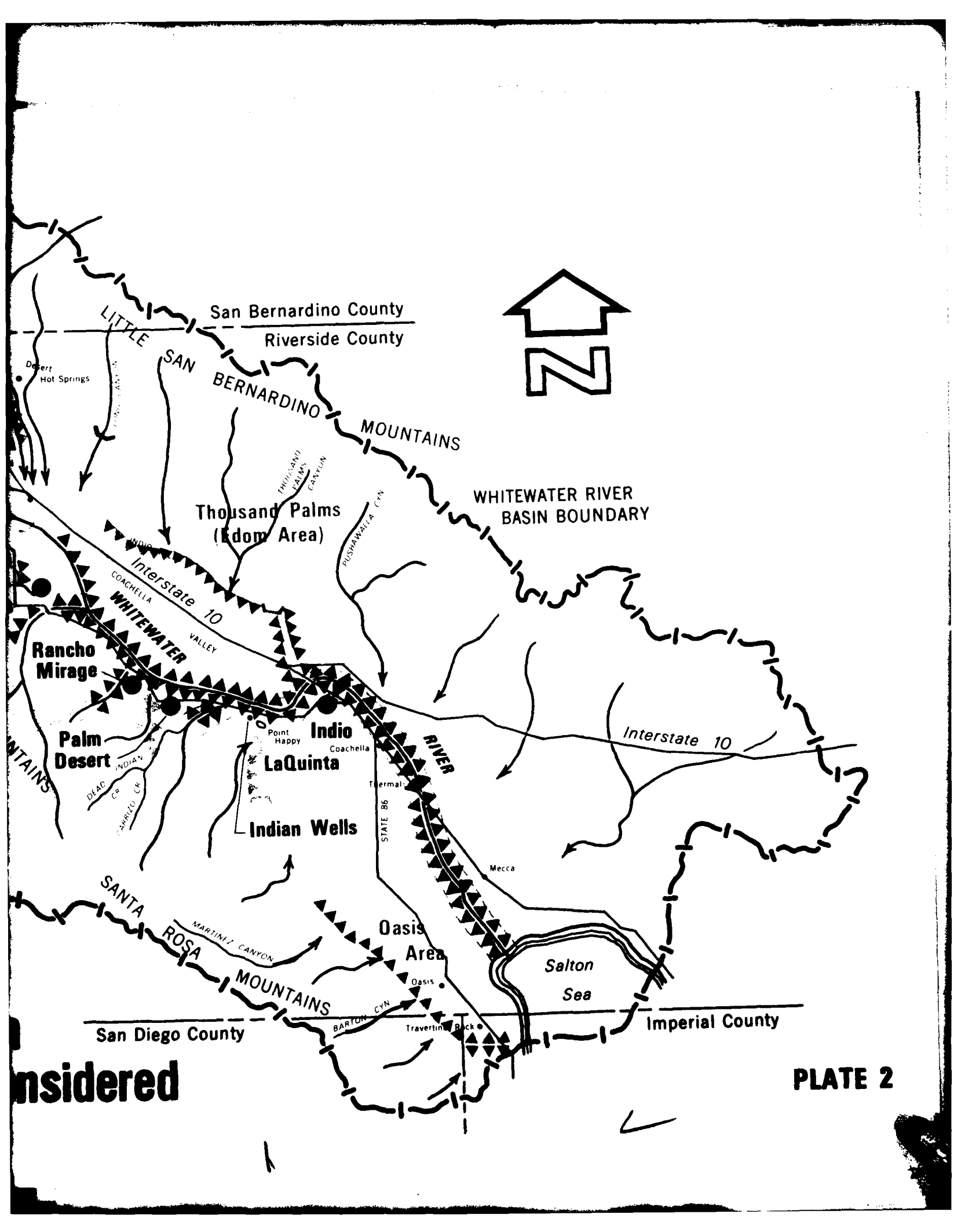

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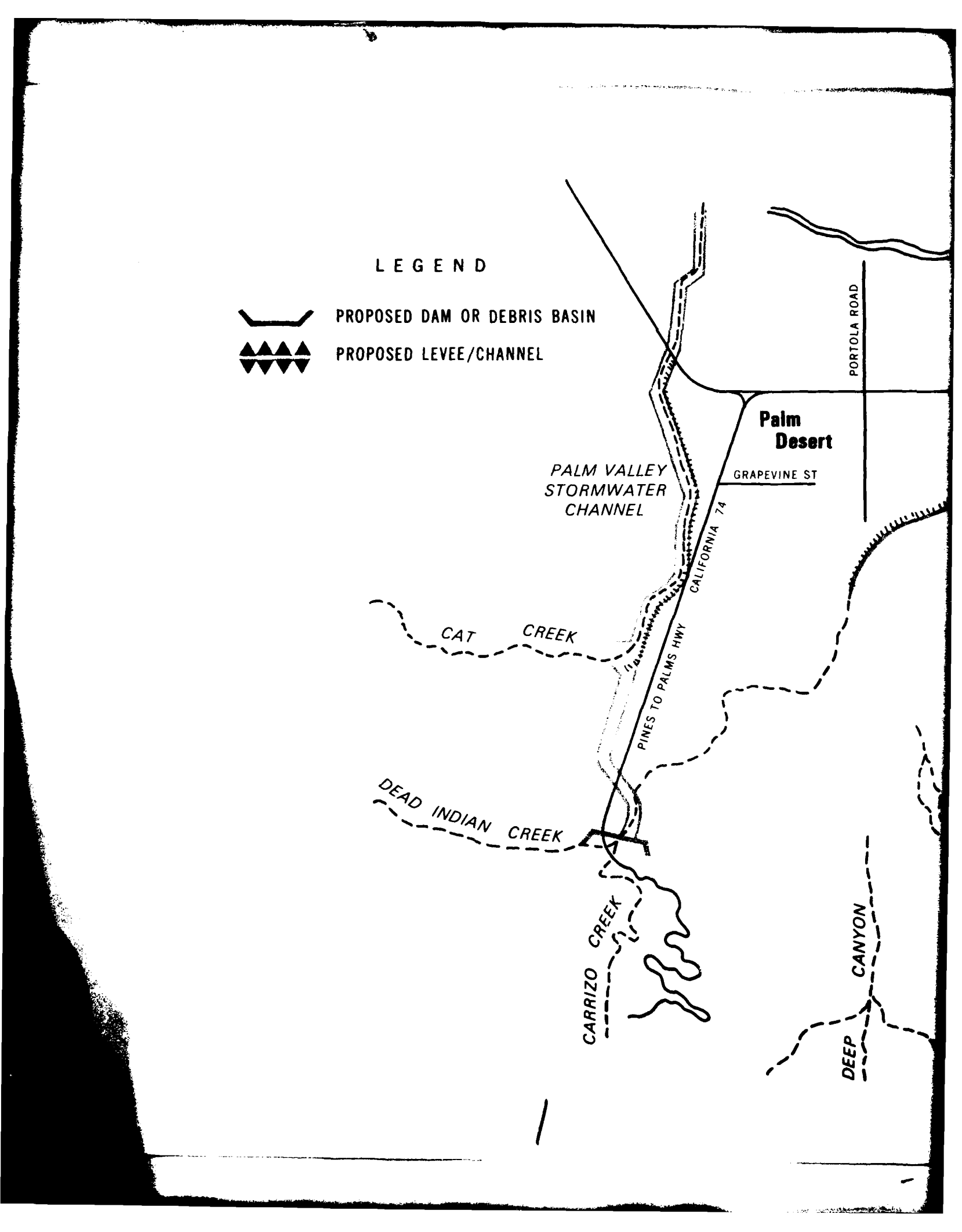
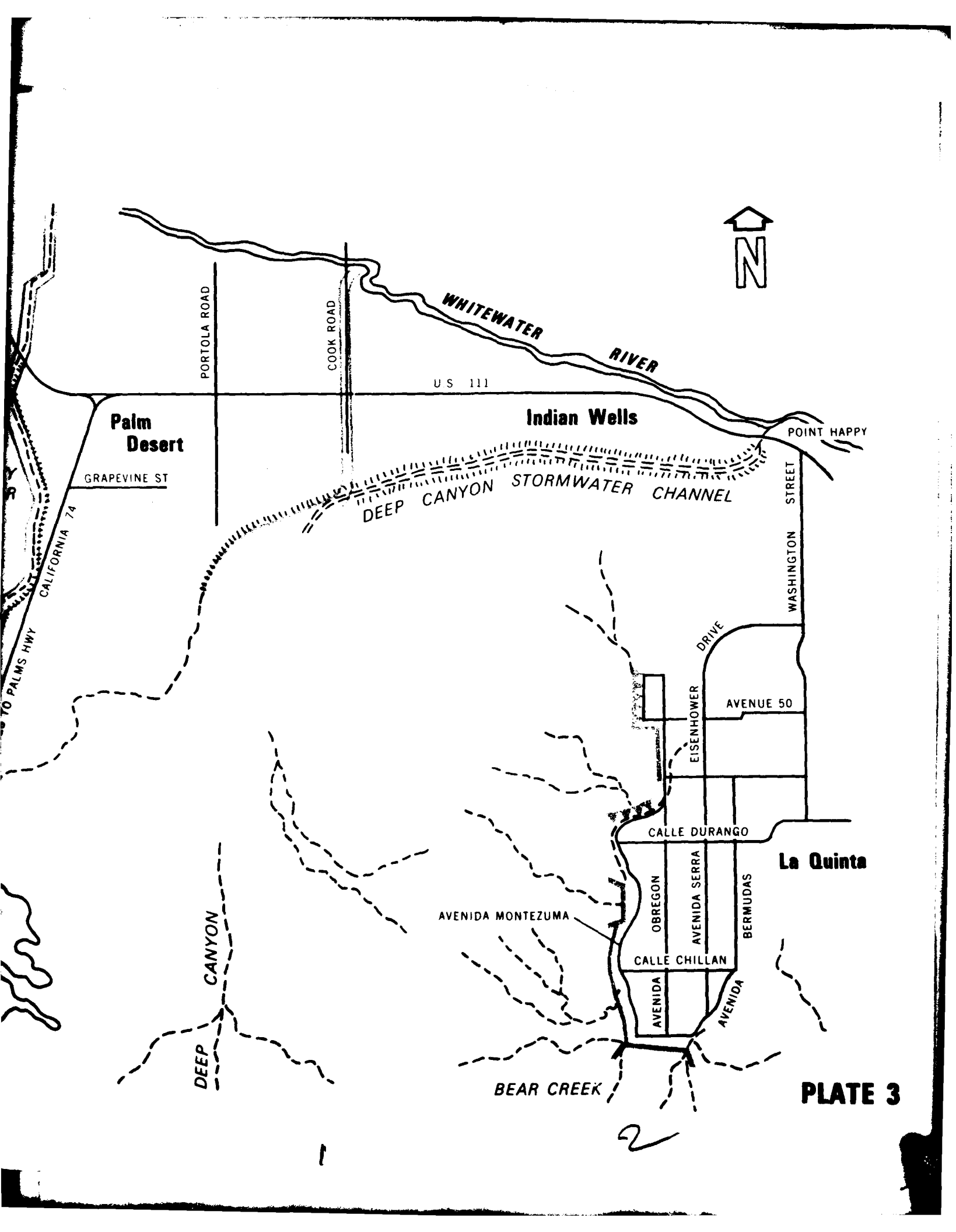
PLATE 2


LEGEND
PROPOSED DAM OR DEBRIS BASIN
PROPOSED LEVEE/CHANNEL
PORTOLA ROAD
Palm Desert
GRAPEVINE ST
PALM VALLEY STORMWATER CHANNEL
CALIFORNIA 74
PINES TO PALMS HWY
CAT CREEK
DEAD INDIAN CREEK
CARRIZO CREEK
DEEP CANYON


N
WHITEWATER RIVER
PORTOLA ROAD
COOK ROAD
US 111
Palm Desert
Indian Wells
POINT HAPPY
GRAPEVINE ST
DEEP CANYON STORMWATER CHANNEL
WASHINGTON STREET
CALIFORNIA 74
TO PALMS HWY
DRIVE
AVENUE 50
EISENHOWER
CALLE DURANGO
La Quinta
OBREGON
AVENIDA SERRA
BERMUDAS
AVENIDA MONTEZUMA
CALLE CHILLAN
AVENIDA
AVENIDA
CANYON
DEEP
BEAR CREEK
PLATE 3

WHITEWATER RIVER — SY[illegible]

ACCOUNTS	NON-STR.	← AREAS RECOMMENDED FOR FURTHER STUDIES — MAIN STEM OF THE WHITEWATER RIVER: SAN GORGONIO & WHITEWATER DAMS	WINDY POINT DAM	GARNET DAM	[illegible] SALTON SEA	MISS[illegible] CHAN[illegible]
ECONOMIC EFFECTS	NONSTRUCTURAL MEASURES SUCH AS FLOOD PLAIN REGULATION, FLOOD PROOFING, RELOCATION, FLOOD INSURANCE, FLOOD WARNING & EVACUATION, AND MODIFICATION OF EXISTING STRUCTURES WILL BE CONSIDERED FOR AREAS IDENTIFIED IN FURTHER STUDIES.					
FIRST COST		$51,000,000	$48,000,000	$17,000,000	$110,000,000	$2,14[illegible]
FLOOD CONTROL COST (AVERAGE ANNUAL)		3,600,000	3,200,000	5,100,000	7,300,000	14[illegible]
FLOOD CONTROL BENEFITS (AVERAGE ANNUAL)		2,000,000	2,280,000	2,500,000	1,400,000	
BENEFIT/COST (BASED ON EXISTING DEVELOPMENT [illegible])		0.6	0.7	0.5	0.2	1[illegible]
REGIONAL EFFECTS						
BENEFICIAL:		← CREATES TEMPORARY INCREASES IN EMPLOYMENT A[illegible]				
ADVERSE:		← NONE ANTICIPATED				
ENVIRONMENTAL EFFECTS		SAN GORGONIO DAM: THE DAM WILL NOT DIRECTLY AFFECT ANY FEDERALLY LISTED RARE OR ENDANGERED PLANT OR ANIMAL SPECIES. THE DAM WILL IMPACT TWO PREHISTORIC TRAILS AND TWO PREHISTORIC ARCHEOLOGICAL SITES. WHITEWATER CANYON DAM: THE DAM WILL HAVE AN EFFECT ON A PROPOSED WILDERNESS AREA. THE WHITEWATER WILDLIFE SANCTUARY AND TROUT FARMS MAY ALSO BE AFFECTED. NO RARE OR ENDANGERED PLANT SPECIES ARE KNOWN TO EXIST IN THE AREA NEAR THE PROPOSED DAM, NOR ARE THERE ANY ARCHEOLOGICAL SITES.	WINDY POINT DAM: THE DAM MAY HAVE A MINOR EFFECT ON THE WINTER RANGE OF THE BIGHORN SHEEP. ANY INCREASE IN THE SUPPLY OF WATER AND HABITAT WOULD BE BENEFICIAL. NO RARE OR ENDANGERED PLANT SPECIES HAVE BEEN IDENTIFIED NEAR THE PROPOSED DAM. ONE PREHISTORIC ARCHEOLOGICAL SITE COULD BE AFFECTED BY THE DAM; HOWEVER, OTHER UNDISCOVERED SITES ARE PROBABLY PRESENT.	GARNET DAM: THE DAM WOULD NOT AFFECT ANY WILDLIFE REFUGE OR SANCTUARIES, NOR WOULD IT AFFECT ANY RARE OR ENDANGERED PLANT OR ANIMAL SPECIES. NO ARCHEOLOGICAL SITES HAVE BEEN RECORDED IN THE AREA; A MAJOR BLOWSAND PROBLEM EXISTS IN THE AREA, WHICH MAY BE AFFECTED BY THE PRESENCE OF A FLOOD CONTROL DAM.	WHITEWATER RIVER CHANNEL AND LEVEE: A SYSTEM OF CHANNELS ALONG THE WHITEWATER RIVER MAY AFFECT THE MARSH AREA AT THE UPSTREAM (NORTHWEST) END OF THE SALTON SEA. WITH THIS EXCEPTION, THE PROJECT WOULD NOT AFFECT ANY KNOWN RARE OR ENDANGERED PLANT OR ANIMAL SPECIES. ARCHEOLOGICAL SITES NEAR THE EXISTING LEVEE IMPROVEMENTS MAY BE AFFECTED BY THE PROJECT.	MISSION C[illegible] CONTROL ST[illegible] MISSION C[illegible] AFFECT TH[illegible] MORONGO W[illegible] NESS AREA [illegible] TRIBUTE TO[illegible] BLOWSAND P[illegible] AREA IMME[illegible] ADJACENT T[illegible] MAY CONTA[illegible] ARCHEOLOG[illegible] NO RARE OR[illegible] PLANT OR [illegible] ARE KNOWN [illegible] AREA.
SOCIAL WELL-BEING EFFECTS						
BENEFICIAL:		← PROVIDES MENTAL AND PHYSICAL SECURITY FROM FL[illegible]				
ADVERSE:		← [illegible] OF POTENTIAL INVASION OF PRIVACY, SOME RES[illegible] [illegible] ON THEIR PROPERTY.				

[illegible]

...VER — SYSTEM OF ACCOUNTS

...TUDIES — ... AREAS NOT REQ...

... CHANNEL TO ...TON SEA	MISSION CRK. CHANNEL & LEVEE	PALM DESERT CH.- CAT, DEAD INDIAN, CARRIZO	INDIAN WELLS (DEEP CYN.) CH. ALONG COOK ROAD	INDIAN WELLS (DEEP CYN.) CH. ALONG EXISTING GRASS-LINED CH.	LA QUINTA RES. & CH.	SMITH CREEK	TENSON CREEK	...
...000	$2,140,000	$10,600,000	$7,400,000	$8,400,000	$5,700,000	$1,300,000	>BENEFITS	...
...000	190,000	700,000	480,000	550,000	380,000	86,000	—	
...,000	2,000	530,000	400,000	400,000	330,000	24,000	5000	
0.2	0.01**	0.8	0.8	0.7	0.9	0.2	MINIMAL	...

...PLOYMENT AND PERSONAL AND BUSINESS INCOME DURING CONSTRUCTION →

...ER RIVER ...AND LEVEE: A ...F CHANNELS ...E WHITEWATER ...Y AFFECT THE ...EA AT THE UP- ...NORTHWEST) END ...ALTON SEA. ...S EXCEPTION, ...ECT WOULD NOT ...NY KNOWN RARE ...GERED PLANT ...L SPECIES. ...GICAL SITES ... EXISTING ...PROVEMENTS MAY ...TED BY THE

MISSION CREEK: A FLOOD CONTROL STRUCTURE ON MISSION CREEK WOULD AFFECT THE PROPOSED MORONGO HILLS WILDERNESS AREA AND MAY CONTRIBUTE TO THE SERIOUS BLOWSAND PROBLEM. THE AREA IMMEDIATELY ADJACENT TO THE CREEK MAY CONTAIN NUMEROUS ARCHEOLOGICAL SITES. NO RARE OR ENDANGERED PLANT OR ANIMAL SPECIES ARE KNOWN TO OCCUPY THE AREA.

FLOOD CONTROL STRUCTURES ON CAT CREEK, DEAD INDIAN CREEK, CARRIZO CREEK, DEEP CANYON, AND LA QUINTA CANYON CREEK WOULD HAVE AN EFFECT ON THE SUMMER AND WINTER RANGES OF THE BIGHORN SHEEP, AS WELL AS AFFECTING SEVERAL OTHER RARE AND ENDANGERED PLANT AND ANIMAL SPECIES. ARCHEOLOGICAL SURVEYS OF THE ABOVE PROJECT AREAS IDENTIFIED 66 ARCHEOLOGICAL SITES.

...Y FROM FLOODS.

...: SOME RESIDENTS WOULD NOT CARE TO HAVE RECREATIONAL FACILITIES

AREAS NOT RECOMMENDED FOR FURTHER STUDIES

...AN WELLS (DEEP CYN.)		LA QUINTA ... CH.	SMITH CREEK	TENSON CREEK	STUBBE CREEK	TWO BUNCH PALMS	RANCHO MIRAGE	OASIS AREA
...LONG COOK ... ROAD	CH. ALONG EXISTING GRASS LINED CH.							
...0,000	$8,400,000	$5,700,000	$1,300,000	>BENEFITS	>BENEFITS	$27,800,000	$2,300,000	$[illegible]
...,000	550,000	380,000	86,000	—	—	1,950,000	184,000	2,000,000
...00,000	400,000	330,000	26,000	3,600	1,000	150,000	68,000	380,000
0.8	0.7	0.5	0.2	MINIMAL	MINIMAL	0.1	0.4	0.2

...SS INCOME DURING CONSTRUCTION →

STRUCTURES ON CAT CREEK, DEAD INDIAN CREEK,
DEEP CANYON, AND LA QUINTA CANYON CREEK
EFFECT ON THE SUMMER AND WINTER RANGES OF
...EEP, AS WELL AS AFFECTING SEVERAL OTHER
...ERED PLANT AND ANIMAL SPECIES.
SURVEYS OF THE ABOVE PROJECT AREAS
ARCHEOLOGICAL SITES.

... ADDITIONAL FACILITIES

PLATE 4

2 1 3

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) RECONNAISSANCE REPORT REPORT FOR FLOOD CONTROL AND ALLIED PURPOSES WHITEWATER RIVER BASIN CALIFORNIA		5. TYPE OF REPORT & PERIOD COVERED 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT P.O. BOX 2711, LOS ANGELES, CA 90053		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT P.O. BOX 2711, LOS ANGELES DISTRICT		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS US ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT P.O. BOX 2711, LOS ANGELES, CA 90053		12. REPORT DATE JUNE 1978 13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Copies are obtainable from the National Technical Information Services, Springfield, VA 22151

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The purpose of this reconnaissance study is twofold. First, it provides for initial iterations of the four functional planning tasks - problem identification, formulation of alternatives, impact assessment, and evaluation - to obtain a preliminary view of what the overall study will involve. Second, it determines how the study will be managed.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)